The Chemical Age

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AN index to Volume XXIX of THE CHEMICAL AGE is published with this issue. It will be found inside the back cover, whence it can readily be detached for binding purposes.

Notes and Comments

Hail 1934 !

DURING the darker periods of 1933 we announced on more than one occasion the imminent sunrise. We take no particular credit for this—it was clear to everyone who had studied world conditions and local trade tendencies. We have read many publications that could be relied upon to tell the unvarnished truth, however unpalatable. From one of these, a publication of the highest standing, we take the opening sentence of each of a series of regular articles: " Anticipations that the beginning of 1934 would witness a further advance in the prices of raw material have not been falsified "; " The boot and shoe industry enters 1934 full of hope for better times than have been experienced for some time "; " Considerable optimism is in evidence in the Welsh steam coal trade "; " No reasonable doubt remains that the trade revival, so long and ardently desired, has begun at last " (from the leading article); " On all sides it is agreed that this year holds out high promise of increased trade "; " The output of iron and steel on Tees-side, although heavier than for a considerable period, is increasing "; " . . . there is a buoyant atmosphere "; " It is a long time since the Sheffield steel industries started a new year with such bright prospects as exist in 1934."

We are not yet at the end of our troubles, but the important fact is that the spirit of optimism and confidence, so lacking in past years, has returned. The big stores in London report that never since the war have they had so good a Christmas season. It is not that people have more money, but that more of the people have some money. Courage in dark days has triumphed. Let us greet 1934 with a cheer.

The Chemical Age Year Book, 1934

HUNDREDS of people engaged in the chemical industry have co-operated with us in making the 1934 edition of THE CHEMICAL AGE Year Book a more complete guide to the industry than any of the eleven editions which have preceded it. The revised arrangement of the contents adopted last year has been generally maintained, but the subject matter has again been subjected to a complete overhaul, and with the help of the officials of the various chemical organisations the directory section has been entirely revised. In volume as well as in usefulness the twelfth edition shows a considerable advance on the 1933 issue. An increased number of advertisers have recognised its value by including their announcements in its pages, and this has enabled us to make the buyer's guide, both in the chemical section and the plant and equipment section, correspondingly more useful to those who seek the assistance which the guide affords. An entirely new feature is the " Who's Who," which provides, on the trading side, personal information which should be of as much value as that already given in relation to the organisations.

A remarkable feature of the industry is the large number of societies concerned either wholly or in part in furthering the professional, trade, economic, legal and social interests of the chemical fraternity, and the new Year Book contains particulars of 168 such organisations and local sections. Even this list is not complete, for many of the parent societies have local and/or subject sections which are not mentioned. In the aggregate there are well over 200 bodies, with a membership running to many thousands. It would, however, be idle to take these statistics as an index of the number of persons engaged in the industry, for a large proportion represent a stage army playing many different rôles. The bibliography introduced last year has been extended by the addition of about a hundred works of reference. The details of new companies registered and of new chemical trade marks are indications of a healthy progress. The principal item of legislation during the past twelve months was the passing of the Pharmacy and Poisons Act, the main provisions of which are summarised in the Year Book. The handy tables have again been revised and extended, due regard being had to a number of suggestions received from subscribers.

Law and the Chemical Engineer

THE paper read by Mr. J. Davidson Pratt and Mr. G. S. W. Marlow before a joint meeting of the Institution of Chemical Engineers and the Society of Chemical Industry on Monday, should be of the highest value as a work of reference to the industry. It was amusing to note how the older speakers with one accord commended the paper as of value to the " young engineers." In our opinion the senior engineers will be equally grateful for a compendium of legal requirements specially relating to chemical works. It is often difficult to track down a requirement through

the numerous Acts of Parliament and Orders, so as to ensure that not only the spirit of the law but the letter also is complied with. Both in their complete digest and in the lucid explanation of the doubtful points in the law, the authors should be congratulated on having performed a task of signal value.

All the legal requirements of an industrial plant must be grasped before new plant is designed. The object of the law-makers' efforts has been, first, the protection of life and health, and second, the non-interference with the rights and enjoyments of those in the neighbourhood of the works. Safety in chemical works is probably more important than in any other type of industrial activity, because the operations are surrounded by danger of explosion, fire, poison, chemical burns and so forth, whilst the substances themselves are for the most part of a harmful character. It is a great tribute to the chemical industry that Mr. Davidson Pratt was able to state that safety precautions have been carried out so well in the past, that statistics show that the industry is as safe as any in the country. No slackening of this effort must be allowed, and this paper will further that object. The official view of the Government Inspectors, as expressed at the meeting, was that many dangers such as those arising from gas, dust and vapour explosions can be prevented by better designed plant coupled with more thorough precautions in the operations.

The Problem of Foreign Plant

AN important phase of safety regulation not expressed by any Orders in Council or Acts of Parliament, is that relating to the safety factor on plants purchased from foreign makers; steam boilers are specifically mentioned in this connection, but we have no doubt that our readers could supply examples from other types of plant also. The difficulty is that of actions arising from negligence. The authors point out that the designer and constructor of a boiler within the meaning of the Act or the person responsible for its maintenance and its use, may find himself mulcted in a considerable sum in the event of the inquiry showing that the responsibility was his. These penalties cannot easily be recovered unless the foreign manufacturer has property within the jurisdiction which can be sequestrated to satisfy the judgment. There is no ready means whereby in all cases the British buyer can be assured as to this. We have here an insidious form of trade competition, in that the foreign builder of boilers may use a lower factor of safety and take a greater risk than the British maker, as he knows that no financial liability can fall on him in the event of an explosion, so long as he maintains no stocks or moneys in Great Britain.

Unfenced Machinery

A HIGHLY important point mentioned was that it was illegal for the chemical engineer to run dangerous machinery in an unfenced condition even in a partly completed works, and if an accident occurs through failure to fence, not only is the occupier liable to heavy penalty under the provisions of the Factory and Workshop Acts, but he is likely to be faced with heavy damage if civil action is taken by the injured person. Machinery and processes are often given a trial run without taking proper precautions, there being some subtle instinct which appears to lead to the belief that there is less danger of personal injury during a trial run than during normal operations, whereas generally speaking the reverse is the truth.

There are many legal requirements regarding effluent, but experienced chemical engineers have given it as their considered opinion that there are two guiding principles each to be adopted in turn for dealing with effluent. The first of these is to consider the question of effluent at the time when the plant is designed; when this is done it is frequently found that the effluent can be used in some other process, or that the deleterous substances can be profitably extracted, so that there need be little effluent at all. When all that is possible in this direction has been done, however, if there still remains a poisonous effluent, by far the simplest and cheapest plan is to take the sewage works manager into full confidence, so that the effluent may be disposed of at the sewage works in the best manner. A feature of the discussion was the agreement concerning the happy effects of co-operation between industry and Government Inspectors, to whom is entrusted the duty of seeing that the laws are obeyed. The inspectors regard themselves not as policemen but as friends and advisers, and we congratulate them on their non-bureaucratic attitude, and upon the successful results which have followed from their efforts. A considerable proportion of the work of the chemical engineer is concerned with maintaining the health and safety of his workmen, and the general amenities of the neighbourhood. After reading this paper one is surprised that he finds so much time to operate and develop chemical processes.

Uninterrupted History

CHARTS from automatic recording instruments give an uninterrupted history of plant conditions. They provide the necessary indication as to where waste is taking place; waste of steam is also waste of money. They also offer the works management an indisputable record that can be analysed and studied. But even then their full purpose has not been fulfilled, for when filed and preserved they provide a permanent record of conditions which are immediately available for future reference and guidance. Being uniform in type and in the scope of the data recorded, they are readily referred one to another with a standard of accuracy which is of the highest degree. You may employ them for the measurement of temperature, pressure or vacuum, or for rate of flow in respect of liquids or gases. If your instruments are sensitive the resulting charts will disclose any and all variations. The results, when analysed, will show what conservation of effort may be attained in your works—savings in fuel, steam or cooling water; time and labour; and items which merge into overhead charges. Recording instruments are now made in patterns to meet a diversity of industrial needs. Charts, likewise, are ready in great variety to collect the available data in a form convenient for reference; in regard to temperature they are available for hundreds of different ranges, graduated for one revolution in 24 hours or in 7 days. If you do not definitely know your plant conditions it is quite possible that manufacturing costs are higher than they should be. They are worth investigating—with the aid of recording instruments and charts.

Legal Pitfalls for the Chemical Engineer

Important Paper Read before the Institution of Chemical Engineers

THE chemical engineer must have an intimate knowledge of the Factory and Workshop Acts and of the Orders under them, with the numerous requirements thereby imposed, in the interests of the health, safety and welfare of the workers, and be acquainted with the various Acts about the emission of noxious fumes and the discharge of effluents and trade wastes. Unless all of these statutory obligations are envisaged from the start of his work, whether it be the layout of a factory or the design of a plant, he may find at a later date, not only that he comes into conflict with the law, but also that he has to effect alterations to the equipment which may entail far more cost than would have been involved by their incorporation in the original design. In a factory installed near a high-class residential area, failure to appreciate the need for preventing the escape of noxious fumes may have disastrous results if it is subsequently found impracticable to reduce the fumes to an amount which cannot be detected. Such an oversight may mean closing the factory or the provision of measures which may have a serious effect on the profitable operation of the plant.

This paper was read at a joint meeting of the Institution of Chemical Engineers with the London Section of the Society of Chemical Industry, on January 8, the joint authors being Mr. J. Davidson Pratt, B.Sc., F.I.C., and Mr. G. S. W. Marlow, B.Sc., F.I.C. Copies of the paper are obtainable from the Institution of Chemical Engineers, price 3s.

Common Law

A nuisance is some act which interferes with comfort, safety, health or enjoyment. A private nuisance is one which affects the interests of some particular person and is actionable at the suit of that person who, if he is to succeed, must prove that he has suffered damage thereby. As examples, the nuisance caused by noisy piledrivers or offensive smells which cause discomfort to a neighbour, may be cited. A public nuisance is one which affects the general interests of the public. Examples are found in highway obstruction, the presence in or near the highway of dangerous or offensive things or the carrying on of an offensive trade. Action in respect of a public nuisance can be taken only by the Attorney-General, representing the public, or by someone authorised by him. Any private person may, however, take action as against a private nuisance, but it is not then material that the public suffers; he must himself have suffered to succeed in his action.

The criteria whether a defendant has been guilty of actionable negligence are (1) that he owed some duty of carefulness to the plaintiff or to the class of persons to which the plaintiff belongs; (2) that he failed in that duty; and (3) that by reason of such failure the plaintiff suffered special damage or injury. A person employed for remuneration is under a duty not only to use the reasonable care of any ordinary man but to exercise that skill which he claims and ought, therefore, to possess. A person performing a public or statutory duty is liable for any negligence on his own part or on that of his subordinates in carrying out that duty.

Safety and Welfare of Workers

The main Acts of Parliament which have to be considered in the design, erection and operation of factories and plant, with a view to safeguarding the workers, are:—

The Factory and Workshop Acts, 1901-1920.
The Notice of Accidents Act, 1906, as amended by the Workmen's Compensation Act, 1925.
The Explosives Act, 1875.
The Boiler Explosions Acts, 1882 and 1890.
The Lead Paint (Protection against Poisoning) Act, 1926.
The Petroleum (Consolidation) Act, 1928.

A great many statutory orders relating to factories, workshops and other places have been issued under the Factory and Workshop Acts. The main Rules and Orders with which the chemical engineer should be acquainted are as follows:—

S.R.O., 1922, No. 731.—Chemical Works Regulations, 1922.
S.R.O., 1908, No. 1312.—Regulations for the generation, transformation, distribution and use of electrical energy, generally called the Electricity Regulations.
S.R.O., 1907, No. 17.—Regulations for the manufacture of paints and colours.
S.R.O., 1911, No. 752.—Regulations for the smelting of materials containing lead, the manufacture of red or orange lead and the manufacture of flaked litharge.
S.R.O., 1921, No. 1443.—Regulations for the manufacture of certain compounds of lead—*viz*., any carbonate, sulphate, nitrate or acetate of lead.
S.R.O., 1928, No. 82.—The Manufacture of Cinematograph Film Regulations, 1928.
S.R.O., 1928, No. 84.—The Cinematograph Film Stripping Regulations, 1928.
S.R.O., 1909, No. 720.—Regulations for the tinning of metal hollow-ware, iron drums and harness furniture.
S.R.O., 1921, No. 1825.—Regulations to apply to factories and workshops or parts thereof, in which celluloid or any article wholly or partly made of celluloid is manufactured, manipulated or stored.
S.R.O., 1931, No. 455.—The Chromium Plating Regulations, 1931.
S.R.O., 1908, No. 1258.—Regulations for vitreous enamelling of metal or glass.
S.R.O., 1928, No. 876.—The Dangerous Occurrences Notification Order, 1928, issued under the Notice of Accidents Act, 1906.

A complete set of all the statutory orders relating to factories and workshops and other places under the Factory and Workshop Acts, 1901-1920, and which are in force on June 30 in any year, is issued by the Home Office yearly. (H.M. Stationery Office, price 4s. net.)

General Ventilation

The first nine sections of Part I of the Factory and Workshop Act, 1901, are devoted to health. Section 1 relates to the sanitary condition of the factory. In addition to stipulating that the factory must be kept in a cleanly state, it requires it to be "ventilated in such a manner as to render harmless, so far as is practicable, all the gases, vapours, dust or other impurities generated in the course of the manufacturing process or handicraft carried on therein, that may be injurious to health." Section 7 requires that sufficient ventilation shall be provided and maintained in every room of a factory. Any standard of ventilation fixed by Order of the Secretary of State must be observed. Section 6 stipulates that adequate measures be taken for securing and maintaining a reasonable temperature in each room in which a person is employed but the measures so taken must not interfere with the purity of the air in the room.

It is illegal to adopt any method of maintaining a reasonable temperature which either uses up the air of the room without renewal, or vitiates the air by returning thereto the products of combustion. For example, it is not permissible to secure the desired temperature by lighting the gas and stopping ventilation. A reasonable temperature is not defined in the Acts, but depends on the nature of the work and the season of the year. 56° to 61° F. has been held by the Courts to be reasonable for a dressmaker's workroom, while 50° to 55° F. was not.

This problem of ventilation has a fundamental bearing on the design not only of the factory but also of the plant. In designing a plant, the chemical engineer should first make such provision as is possible to reduce to a minimum the amount of dangerous vapour or dust which can be liberated, and should then so arrange the local ventilation of the plant that any noxious fumes which may be emitted, in spite of every attention to design, are drawn off by local suction from the area of liberation using, where necessary, hoods to surround the area, the noxious fumes thus being prevented from escaping into the workroom. Attention to the removal

of fumes at their origin will be found, not only to be the most economical way of dealing with the problem, but also to provide the best safeguard for the health of the worker. Steps must be taken to ensure that the noxious fumes or vapours are not discharged from the exit end of the ventilating system in such a way as to constitute a nuisance or infringe other legislation, such as the alkali Act. This may necessitate scrubbing, or otherwise treating the effluent air, to absorb or condense the noxious material.

The only other section of Part I dealing with health, which has direct interest to the chemical engineer is Section 8 which requires adequate provision for the drainage of floors where wet processes are conducted.

Safeguarding of Machinery

Sections 10 to 18 of the Act relate to safety, and contain many provisions with which the chemical engineer must be intimately acquainted, since moving machinery is found in nearly every factory. Sections 10, 12, 13 and 17 relate to the safeguarding of machinery. The obligation to fence is absolute. It is an obligation not merely to fence, but to fence securely. If a machine cannot be securely fenced while remaining commercially practicable or mechanically useful, the Statute in effect prohibits its use.

The chemical engineer should always remember that it is illegal to run dangerous machinery in an unfenced condition even in a partly completed works, and if an accident occurs through failure to fence, not only is the occupier liable to heavy penalty under the provisions of the Factory and Workshop Acts, but he is likely to be faced with heavy damages if civil action is taken by the injured person. Further, in such cases claims on insurance companies or associations are often rendered null and void owing to the accident arising from a breach of statutory duty. Hence, where permanent guarding cannot be provided before the machinery is run, adequate temporary provision should be made to ensure the safety of the worker.

In a chemical works the problem of safeguarding centrifugals will often arise and can be solved by interlocking the guard for the basket with the starting and stopping arrangements so that the cover cannot be opened while the basket is in motion.

The various pamphlets of the Factory Department of the Home Office will be found to be very useful on the subject of safeguarding, while an inspection of the various methods of guarding machinery demonstrated at the Home Office Industrial Museum, Horseferry Road, London, will provide much valuable material for the designer.

Steam Boilers, Autoclaves and Jacketed Pans

Section 11 requires that every boiler for the generation of steam whether used as a unit or one of a series must be provided with a proper safety valve and proper steam and water gauges to show the pressure of steam and the height of water in the boiler. The boiler must be examined thoroughly by a competent person at least once every 14 months and must be maintained with its accessories in proper condition. The report of the result of the examination must be on the prescribed form (Factory Act Form 55) and signed by the "competent person." This form must be kept attached to the general register which is kept under the Factory Acts. "Competent person" is not defined, but it may be taken that this is a person who, by his technical training, knowledge and experience, is able to detect defects and to make all the necessary calculations on the strength of the various parts of boilers and fittings and on the loading of the safety valve. The examination of steam boilers therefore needs special experience which is not obtained by all engineers. The responsibility for selecting the competent person rests with the occupier of a factory, and to avoid any question on this point, the majority of firms insure their boilers with a reliable boiler insurance company.

According to Clause 3 of the 1882 Act the term "boiler" has a wide significance and means "any closed vessel used for generating steam or for heating water or for heating other liquids, or into which steam is admitted for heating, steaming, boiling or other similar purposes." Under this definition all stills, jacketed pans, autoclaves, etc., are boilers and it has been held that a steam duct, 1,000 ft. long, leading from a boiler at the top of a mine shaft to a steam receiver at the bottom is a "boiler." Clause 5 of the Act states that notice of all boiler explosions, with relevant details, must be sent within 24 hours to the Board of Trade by the owner or the user or someone acting on their behalf. Neglect to arrange for the periodical examination of all steam plant, with consequent lack of proper maintenance, is often the primary cause of failure of such plant. In this connection the reports on boiler explosions issued by the Board of Trade will be found to contain much useful information.

The designer and constructor of a boiler within the meaning of this Act, or the person responsible for its maintenance and its use, may find himself mulcted to a considerable sum in the event of the inquiry showing that the responsibility was his. These penalties cannot at all easily be recovered when the boiler is of foreign origin, unless the foreign manufacturer has property within the jurisdiction which can be sequestrated to satisfy the judgment. There is no ready means whereby in all cases the British buyer can assure as to this. We have here an insidious form of trade competition, in that the foreign builder of boilers may use a lower factor of safety and take a greater risk than the British maker, as he knows that no financial liability can fall on him in the event of an explosion, so long as he maintains no stocks or moneys in Great Britain.

Unhealthy and Dangerous Premises

Special attention is directed to the powers contained in the first clause of Section 18, whereby a court of summary jurisdiction may, on complaint by a factory inspector and on being satisfied that any place used as a factory, or part thereof, is in such a condition that any manufacturing process carried on in it, cannot be so carried on without danger to health, or to life and limb, prohibit the use of that place for the process in question until such works have been executed as in the opinion of the court are necessary to remove the danger. This must be borne in mind in designing and erecting a works or a plant, as it is always cheaper to provide the measures necessary for the safety and health of the workers in the original design than to modify the plant at a later stage.

If any part of the ways, works, machinery or plant used in a factory, including a steam boiler, is in such a condition that it cannot be used without danger to life or limb, a court of summary jurisdiction may prohibit its use or may prohibit its use until it is repaired or altered.

Chemical Works Regulations

The provisions, just described, in the Factory and Workshop Act, 1901, are of a general character and apply to industry as a whole. The Chemical Works Regulations, 1922, issued as S.R.O. 1922, No. 731, deal with special statutory requirements for the chemical industry and should be carefully studied by every chemical engineer. The schedule to the regulations defines chemical works as being any works or that part of a works in which :—

(1) The manufacture or recovery of any of the following is carried on :—
  (*a*) carbonates, chromates, chlorates, oxides, or hydroxides of potassium, sodium, iron, aluminium, cobalt, nickel, arsenic, antimony, zinc or magnesium.
  (*b*) ammonia and the hydroxide and salts of ammonium.
  (*c*) sulphurous, sulphuric, nitric, hydrochloric, hydrofluoric, hydriodic, hydrosulphuric, boric, phosphoric, arsenious, arsenic, lactic, acetic, oxalic, tartaric, or citric acids and their metallic or organic salts, and

(2) A wet process is carried on :—
  (*a*) For the extraction of metal from ore or from any byeproduct or residual material; or
  (*b*) In which electrical energy is used in any process of chemical manufacture.

(3) Alkali waste or the drainage therefrom is subjected to any chemical process for the recovery of sulphur or for the utilisation of any constituent of such waste or drainage.

(4) Carbon bisulphide is made or hydrogen sulphide is evolved by the decomposition of metallic sulphides, or hydrogen sulphide is used in the production of such sulphides.

(5) Bleaching powder is manufactured or chlorine gas is made or is used in any process of chemical manufacture.

(6) (*a*) Gas tar or coal tar or any compound product or residue of such tars is distilled or is used in any process of chemical manufacture.

(*b*) Synthetic colouring matters or their intermediates are made.
(7) The refining of crude shale oil or processes incidental thereto are carried on.
(8) Nitric acid is used in the manufacture of nitro compounds.
(9) Explosives are made with the use of nitro compounds.

Difficulty will undoubtedly arise in determining whether a particular process falls within the above definition or not. Since the object of the regulations is to safeguard the worker, it is suggested that in doubtful cases it should be assumed that the regulations do apply or the local factory inspector should be consulted on the particular set of regulations which should be followed.

Vessels Containing Dangerous Material

Paragraph 1 of the Chemical Works Regulations lays down the structural requirements necessary to eliminate all reasonable risk of accidental immersion of any part of the body in any open pot, pan, vat, or other vessel containing any dangerous material. Dangerous material is not defined, but hot water falls within this category, and in any case the court will determine as a question of fact whether a material is dangerous or not. Generally, secure fencing to a height of at least 3 ft. is required above any adjoining ground or platform unless the edge of the vessel is at least 3 ft. above the ground or platform and for any gangway over the vessel, which gangway must be at least 18 ins. wide. An exception is made of that part of the sides of a brine evaporating pan at which raking, drawing or filling is carried on, and in saturators used in the manufacture of sulphate of ammonia. Gangways must be fenced on both sides by upper and lower rails or by other equally efficient means. Neglect to provide a bottom rail is sometimes the cause of accidents through persons tripping and slipping under the top rail. Barriers must be provided to prevent passage between adjoining vessels when the space between them is not otherwise fenced.

Paragraph 18 requires the edge of every caustic pot to be at least 3 ft. above the adjoining ground or platform.

Special Ventilation Problems

In addition to the general requirements of the Factory and Workshop Acts, paragraph 2 of the Chemical Works Regulations specifies that an efficient exhaust draught, that is, localised ventilation effected by mechanical or other means, must be used in drawing a charge from a salt cake furnace, in the slaking of lime, except in the open or in an enclosed appliance, and in any process where arseniuretted hydrogen may be generated.

For the grinding, crushing and packing of caustic, and in chrome, nitro and amido processes wherever dust is generated or fume is evolved, the provision of an efficient exhaust draught is also required, while the escape of dust, or fume, or contaminated steam into the air of the workroom should be prevented, Paragraphs 21 and 22. Mills, screens, etc., for dealing with anhydrous lime, must be so enclosed as to prevent the escape of dust, Paragraph 3. A similar requirement applies to every machine for the grinding or crushing of caustic, Paragraph 22.

The necessity for the provision of adequate means for the removal at its point of origin, by exhaust draught, of any dust or vapour which may be generated in a process, so as to prevent its escape into the air of a workshop, appears in quite a number of other regulations under the Factory Act. Of these, the more important are the following:—

(*a*) The Indiarubber Regulations, 1922 (S.R.O., 1922, No. 329). Provision of an efficient localised exhaust draught may be waived for any process in which the only fumes are those arising from the use of pure or commercial benzole, provided that a standard of general ventilation of 30 changes of air per hour is maintained during working hours. It is further stipulated that where a plenum system is used for the supply of fresh air in a room in which a fume process is conducted, the velocity of the incoming air shall not exceed 350 ft. per minute. In these regulations a fume process is any process involving the use of carbon bisulphide, sulphur chloride, benzole, carbon tetrachloride, trichlorethylene, or any carbon chlorine compound.
(*b*) The Chromium Plating Regulations, 1931 (S.R.O., 1931, No. 455).
(*c*) Regulations for the Manufacture of Paints and Colours S.R.O., 1907, No. 17). Any dust arising from a lead process must be removed by exhaust ventilation or, alternatively, the process must be conducted in an apparatus so closed as as to prevent the escape of dust.
(*d*) Regulations for the Manufacture of certain Compounds of Lead, *viz.*, any carbonate, sulphate, nitrate or acetate of lead (S.R.O., 1921, No. 1443).
(*e*) Regulations for the Smelting of Materials containing Lead, the Manufacture of Red or Orange Lead, and the Manufacture of Flaked Litharge (S.R.O., 1911, No. 752).
(*f*) Regulations for Vitreous Enamelling of Metal or Glass (S.R.O., 1908, No. 1258).

In ventilation care must always be taken that the means provided for the removal of noxious gases, vapours, fumes or dust, do not cause a contravention of the provisions of the Alkali, etc., Works Regulation Act, 1906.

Inflammable Gases, Vapours and Dusts

The provisions of Paragraph 4 of the Chemical Works Regulations, with the exception of sub-paragraph (*a*) just mentioned, deal with certain of the main precautions to be followed to avoid explosions from inflammable gases, vapours or dust. These must be carefully studied as they imply more than would appear at first sight. Instructions apply not only to rooms, but also to vessels, tanks, containers or structures of any sort which may contain or have contained inflammable gases, vapours or dusts; for example, petrol or acid tanks. Neighbouring rooms or buildings into which the inflammable atmosphere is likely to pass should be included.

Difficulties will often arise in practice in deciding whether the products handled in a plant are such as to require these special provisions. In the regulations for the transport of dangerous goods, it is generally laid down that all substances having a flash point below 150° F. are to be regarded as dangerous, thereby implying that those with flash points over 150° F. are non-dangerous. Liquids with flash points below 73° F. are always classed as specially dangerous. This upper limit of 150° F. cannot be applied to factories, because so much depends on the conditions under which the liquid is handled. It is possible, for instance, to imagine conditions under which operations with such an inflammable liquid as ether would be attended with less risk than the normal use of a liquid with a far higher flash point. On the other hand, liquids with a flash point of over 150° F. may become dangerous, and should be regarded as such, if an escape of the hot liquid is likely to occur.

The Home Office Industrial Museum will provide useful information about suitable types of electrical apparatus, while information about flame-proof equipment can be obtained by consulting the specifications of the British Standards Institution. A memorandum by the Chief Inspector of Explosives, Home Office, entitled "Electric Light and Power in Factories and Magazines for Explosives," and the Home Office memorandum on the electrical regulations, Factory Form No. 928, will also be of interest. Other documents which might profitably be consulted in regard to problems of inflammable vapours and dusts are:—

(1) Factory Form 826. "Memorandum on the Manufacture, Use and Storage of Cellulose Solutions."
(2) Factory Form 275. "Precautions on the Manufacture, Use and Storage of Cellulose Solutions."
(3) Factory Form 824. "Memorandum on Dry Cleaning."
(4) Factory Form 829. "Memorandum on Dust Explosions in Factories."

Particular attention should be given to this problem where dusts are generated. Every year there are a number of serious dust explosions, and often the most unlikely materials will give rise to explosive mixtures with air when in a very finely divided state.

Pressure Vessels

Paragraph 5 of the Chemical Works Regulations requires that every still and every closed vessel in which gas is evolved, or into which gas is passed, and in which the pressure is liable to rise to a dangerous degree, shall have attached to it and maintained in proper condition, a proper safety valve or other equally efficient means to relieve the pressure. The significant words are "to a dangerous degree," which mean that a safety valve is obligatory in the system only where there is a danger of the pressure rising above the normal working limit. In effect, this regulation is an extension of the requirements for steam boilers, already mentioned. This

requirement applies to any receptacle, the interior of which is exposed to the direct or indirect action of steam under pressure, or to gases and vapours under pressure produced by chemical reactions or by heat. Each case must be considered in relation to the normal working pressure and the maximum safe pressure which the vessel will stand.

The object of this regulation is to prevent explosions or fractures which may occur if closed vessels are subjected to excessive internal pressure and which may have serious results if the contents are of a dangerous nature. The main safeguards are to ensure that the vessel is suitably designed, is of adequate strength to provide a reasonable margin of safety over and above the maximum pressure to which it is to be subjected in use, and is fitted with an efficient safety valve, or other equally reliable means of releasing the pressures should it rise above the pre-determined safe maximum. Many cases will come to the notice of the chemical engineer, such as stills, autoclaves, compressors, etc. This regulation does not necessarily require every vessel in a pressure system to have a safety device; it suffices that the safety valve is so placed that it will always function, no matter what part of the system is in use.

It is highly desirable, in carrying out this requirement, that there should be no valve or isolating arrangement between the safety device and the vessel for which it must operate, or between it and the open end of the escape pipe. Sometimes, as, for example, with air compressors, there is a valve inserted between the air receiver and its safety device to permit closing the line while work is in progress on the safety device. Even if it is stipulated that the stop valve be locked in the open position when not in use for the above purpose, the system does not comply strictly with the Chemical Works Regulations, and the only way to overcome the difficulty would be to have two safety valves so that one can always be in operation.

Entry of Workmen into Vessels

Before any person is allowed to enter any absorber, boiler, culvert, drain, flue, gas purifier, sewer, still, tank, tower, vitriol chamber, or, in fact, any place where there is reason to apprehend the presence of a dangerous atmosphere, a responsible person shall personally examine the place and give a written certificate regarding its condition. This examination can only be dispensed with in a case of rescue, when every second is valuable. Unless the place has been isolated and sealed from every source of dangerous material, whether solid, liquid or gaseous, which should be done by disconnecting and blocking all pipes or other openings by which any material could find its way into the place (Paragraph 19), no one shall be allowed to enter unless he is wearing a breathing apparatus and a life-belt, the other end of the rope attached to which is held by a man outside whose sole duty is to watch the wearer and draw him out if he appears to be affected by gas. The requirements of breathing apparatus and a life-belt also apply in the case of rescue.

A point, not made clear in this regulation, is the necessity for disconnecting or locking any moving parts inside the vessel or place to prevent their being inadvertently set in motion when a man is inside. By this regulation an unprotected man must not be allowed to enter a dangerous place unless and until it has been properly cleaned and ventilated, so that it is free from all noxious material. If repairs have to be executed, the work may release dangerous material which has been trapped in the sludge, scale or other deposit in the vessel, so that the cleaning and ventilating processes may have to be repeated until all danger has been removed.

The memorandum on the cleaning and repairing of oil and acid stills and tanks in factories, Factory Form 814, which sets forth the cleaning procedure in considerable detail and a very interesting set of papers on the same subject, which were given by members of the Association of British Chemical Manufacturers at the National Safety Week Congress at Leeds in May, 1931, are well worth reading.

Provision for the cleaning, inspection and repair of plant, so that any dangerous sludge or deposit can be easily removed by washing or by spades from outside the vessel and the process of ventilation can be conducted with the greatest speed and efficiency, should be, therefore, an important feature of any design. The best course for vessels which men have to enter is to have two manhole openings at diagonally opposite ends, the bottom outlet being situated so as to facilitate the complete removal of the solid or liquid contents of the vessel. Openings so situated make it easy to get a good draught through the vessel without artificial ventilation.

All manholes should be of adequate size, not merely for a man to get in or out, but large enough to allow an unconscious man to be drawn out speedily. There is now a British Standards Institution specification, B.S.S. No. 470, governing the size of manholes; its requirements should be regarded as the minima, and even larger manholes may well be provided whenever possible.

(To be continued.)

Institution of Chemical Engineers

Another Year of Useful Work

THE Institution of Chemical Engineers is able to record another year of useful work, as well as a still further increase in membership. At the annual corporate meeting, held in February, Viscount Leverhulme was re-elected president, Dr. H. Levinstein and Mr. H. Talbot were elected vice-presidents, and Mr. F. A. Greene and Mr. H. W. Cremer were re-elected hon. treasurer and hon. secretary respectively. New elections to the Council included Col. E. Briggs, Mr. C. C. H. Brazier, and Mr. H. A. S. Gothard. The presidential address dealt with "Chemical Engineering and the Soap Industry," in which Lord Leverhulme described the various phases of soap manufacture from the earliest times down to the most up-to-date factory of the present day.

The Moulton Medal for 1932 was presented to Dr. C. M. White for a paper on "Fluid Friction and its Relation to Heat Transfer"; the Junior Moulton Medal and Prize to Dr. W. B. Hawes for a paper on "Some Sidelights on the Heat Transfer Problem"; and the Osborne Reynolds Medal was presented to Professor S. G. M. Ure in recognition of his great services to the Institution as Honorary Editor.

Several papers of unusual interest were presented before the Institution during the year 1933, including three papers from abroad.

In January a symposium of papers on sewage disposal practice in Great Britain, the United States, and Germany were discussed, and in November Dr. Friedrich Bergius read a paper on "The Utilisation of Wood for the Production of Foodstuffs, Alcohol and Glucose." Other papers included: "Metallurgy from the Standpoint of the Chemical Engineer," by Mr. L. Singlehurst-Ward; "The Mechanical Properties of some Austenitic Stainless Steels at Low Temperatures," by Messrs. E. W. Colbeck, W. E. MacGillivray, and W. R. D. Manning; "The Mechanical Properties of Metals at Low Temperatures: Part II—Non-Ferrous Materials," by Messrs. E. W. Colbeck and W. E. MacGillivray: "The Sedimentation of Fine Particles— a survey of theory and practice," by Mr. R. F. Stewart and Dr. E. J. Roberts, and "The Corrosion and Protection of Magnesium and its Light Alloys," by Dr. G. D. Bengough and Mr. L. Whitby.

In April a joint meeting was arranged with the Chemical Engineering Group and the Liverpool Section of the Society of Chemical Industry. After a visit to the Clarence Dock Power Station, Dr. F. J. Brislee presented an interesting paper on "The Corner Metals of Electrical Distribution—Copper, Aluminium and Lead." The Public Lecture of the year, delivered by Professor G. T. Morgan, on "Engineering in the Service of Chemical Research," attracted a large audience.

Six meetings were held by the Graduates and Students Section during the year. At the annual meeting of the Section in May, Mr. K. L. Emler was elected chairman in succession to Mr. K. Fraser, and Mr. L. W. Blundell was re-elected hon. secretary. There was a large and distinguished gathering at the president's reception, held at the Waldorf Hotel on November 22, some four hundred guests being received by the president and Viscountess Leverhulme. The Associate-Membership examination for 1933 was held generally on the lines followed during the last few years. Ten candidates were examined, of whom seven satisfied the examiners.

New Scientific Instruments and Apparatus

Exhibits at the Annual Exhibition of the Physical Society

THE twenty-fourth annual exhibition of scientific instruments and apparatus, organised by the Physical Society, was held at the Imperial College of Science and Technology, South Kensington, January 9-11. Eighty firms were exhibiting in the trade section and there were thirty exhibitors in the research and experimental section. Included among the latter was a new disappearing filament optical pyrometer designed for precision measurements of high temperatures for small objects (Mr. M. Milford and others, of the Clarendon Laboratory, Oxford); exhibits relating to the effect of the temperature of liquid hydrogen on the tensile properties of 41 specimens of metals (Sir Robert Hadfield and the Research Department of Hadfields, Ltd.); colour adaption experiments and a new form of trichrometic colorimeter (Dr. W. D. Wright and Mr. F. H. G. Pitt, of the Imperial College of Science and Technology); and apparatus for measuring the heats of combustion of gases (Mr. J. H. Awbery and Dr. E. Griffiths, of the National Physical Laboratory). In addition there was a section for apprentices and learners, included with the object of encouraging craftsmanship in the scientific instrument trade.

A New Optical Pyrometer

A NEW type of optical pyrometer which is direct reading and completely self-contained in a small portable case (Fig. 1) was shown by Elliott Brothers (London), Ltd. The principle involved is that of maintaining the filament of an electric lamp at a definite known and constant temperature, and reducing the incoming radiation from the hot body whose temperature is to be measured, until the filament apparently disappears into the background. This reduction of the radiation is accomplished by the interposition of a wedge-shaped graduated absorption screen (calibrated in temperature degrees) between the standard lamp and the hot body. A unique feature of this Siemens cross-filament optical

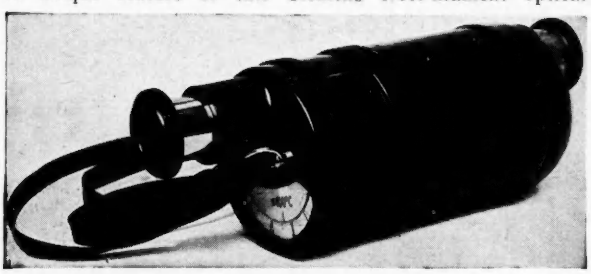

Fig. 1. The Siemens Cross-filament Optical Pyrometer. (Elliott Brothers, London, Ltd.).

pyrometer is the ingenious method of obtaining and maintaining the standard lamp temperature. Actually, the lamp has two filaments crossing each other, a ribbon and a wire flattened at the place of conjunction. These filaments are composed of two materials which have diverse temperature current characteristics. They are connected in series and supplied with current from an incorporated battery through an adjustable resistance. The two filaments are equally brilliant at one temperature only, and this temperature is quickly and easily obtained bv adjusting the resistance until the two filaments merge into each other. This adjustment needs very little attention, once it has been set, unless the battery is becoming exhausted.

Microscopy by Incident Light

RECENT advances in microscopy are not so much due to improvements achieved in the magnifying system but to a far greater extent to the changes which have taken place in the methods and means for producing an appropriate illumination. The most perfect formation of microscopic images of opaque objects can only be obtained by a mode of illumination by incident pencils of rays lying entirely outside the path of the rays of the microscope. Such an illuminating system, when arranged so that no direct light falls upon or enters the front lens of the objective, entirely eliminates reflections within the path of the rays of the microscope, and, although the objectives are used at full apertures, does not give rise to glare and haze in the microscopic image. The Ultropak Illuminator (Fig. 2), as exhibited by E. Leitz (London), furnishes ultra-illumination by incident light up to the highest magnifications and affords the special advantage that it can be so set and the illuminating rays selectively

Fig. 2. The Ultraspate Illuminator for Microscopy. (E. Leitz, London).

cut off as to adjust the illumination in each case individually to meet the requirements of the object under observation. The source of light is generally a small 8 volt, 0.6 ampere low-voltage filament lamp fitted to the Ultropak Illuminator in a special centring mount. This lamp furnishes a very intense light which suffices for ocular observations of every kind, and, apart from exceptionally unfavourable objects, admits of photomicrographs being taken in conjunction with camera attachments.

A Rotary Blower and Vacuum Pump

IN designing the Edwards rotary blower and vacuum pump (Fig. 3) attention has been paid to the problem of maintaining high efficiency over long periods of use. Machines of this

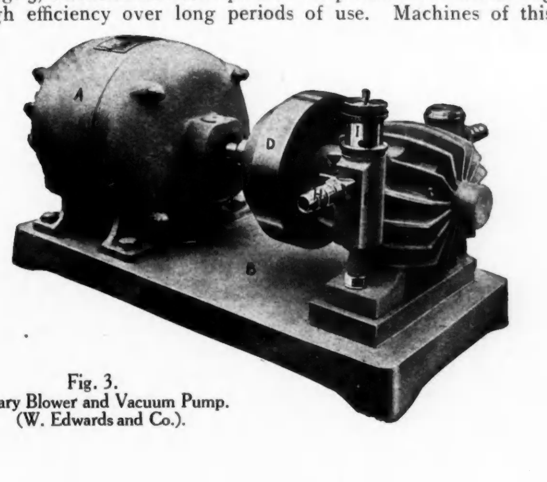

Fig. 3. Rotary Blower and Vacuum Pump. (W. Edwards and Co.).

type, hitherto available, have generally been subject to rapid deterioration of performance, but the user can install this new unit with every confidence that the initial high standard of performance will be maintained throughout its long working life. Its impressive features are the special lubricating system, cleanliness and cooling arrangements. A special lubricating system has been devised whereby oil is collected continuously from a large oil chamber and pumped to the rotor and blades. Cleanliness is ensured by the fact that, before issuing from the outlet, the ejected gases pass through a filter, and the oil collected is returned to the sump. Cooling is effected by fins on the body of the pump and further assisted by an efficient fan; extremely satisfactory results are thus obtained, with a saving in the initial and maintenance costs by the avoidance of water cooling. The space occupied is only 15 in. × 8½ in. × 8 in. and the total weight is 40 lb.

Temperature Recording Instruments

ONE of the latest type of mercury-in-steel recording thermometers fitted with a special type of bulb which, when held in contact with the surface of a hot roll, enables an accurate record of surface temperature to be obtained, was shown by Negretti and Zambra. In this "Mersteel" temperature recorder (Fig. 4) the edge of the case makes a moisture-proof joint against a rubber ring sunk in the frame of the door. All parts of the movement are interchangeable, and non-rusting; the steel Bourdon tube and the inner steel tubing are enamelled, the pen arm and pen is made of monel metal, the spindle of nickel silver, the connecting links of brass or nickel silver, and the hinge pins of stainless steel. At this stand there was also an electrical resistance or thermocouple temperature recorder of the continuous chart type, suitable for recording temperatures of from one to six points on the chart (Fig. 6). The instrument is fitted with a synchronous motor drive giving exact timing and permitting the recorder to be run for 50 days without attention. A multi-coloured ribbon is used enabling easily distinguishable traces to be obtained. The switching to the various points is made by means of mercury switches of special type, avoiding troubles due to dirty contacts, etc. Models are made for both flush-panel or projection-from-panel mounting.

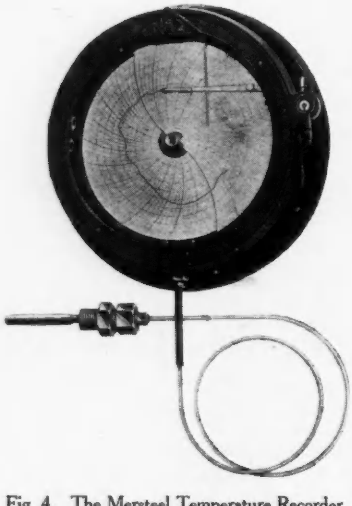

Fig. 4. The Mersteel Temperature Recorder. (Negretti and Zambra).

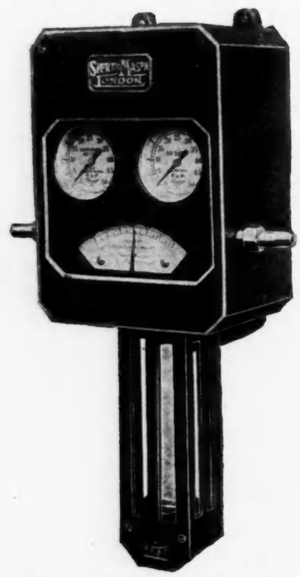

Fig. 5. The Universal Hygrostat. (Short and Mason, Ltd.).

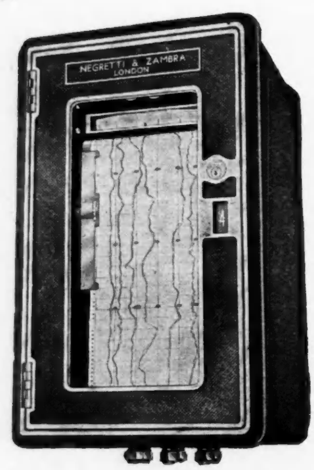

Fig. 6. Multipoint Recording Pyrometer. (Negretti and Zambra).

A Universal Hygrostat

THE Universal hygrostat (Fig. 5) which was shown by Short and Mason, Ltd., has been designed to cope with all the various methods of controlling humidity in the atmosphere. It is provided with two completely independent mechanisms for indicating and controlling relative humidity in an enclosed space, and gives direct readings without the use of psychrometric tables. Furthermore, it is an instrument which can be incorporated as part of an engineering installation and which can be relied upon to control the operation of air conditioning equipment so as to give the necessary conditions. In some industries or processes, it is desirable to avoid the costly effects of dry air; in others it is desired to dry materials efficiently and economically, which requires the control of temperature, humidity, and circulation, and in many cases removal of dust from the air before it is used. In some industries the air must be humidified to a definite percentage of relative humidity which may vary with departments; in others it must be dehumidified. All these problems call for the correct application of hygrostatic control. Such an instrument is the Universal hygrostat, which is supplied in air operating or electric operating models. As seen from the accompanying illustration this instrument can be mounted on a wall, pillar or in a duct. There is a simple slide adjustment to obtain the optimism unit sensitivity for any particular application and a simple key adjustment for setting the control point. The air operated model consumes 0.5 cu. ft. of free air per minute at 25 lb. per sq. in., the electric model requires 10 watts to operate at 230 volts.

Improved Colorimeters

COLORIMETERS of the Duboscq type (Fig. 7) in six different models designed to meet the most exacting requirements, were exhibited by the Bausch and Lomb Optical Co., Ltd. Into the construction of these colorimeters are built such refinements as optically inactive tube bottoms, plungers of optical glass matched for colour, adjustments of microscopic precision, and a dust proof housing for the prism system. Light from an even source of illumination is passed through the two sides of the instrument. There are interposed in these two light paths the substances which are to be tested. Some of the light in passing through the liquids is absorbed, the amount of absorption depending on the depth and concentration of the solution. The two beams of light are now brought to a common axis by means of the rhombohedral prisms. Light from one cup illuminates one-half of a circular field and light from the other cup illuminates the other half. The observing microscope, by which the observer sees both fields with one eye, is focused on the line of separation of the two fields. It is now possible to alter the depths of the two columns of liquid until the two halves of the field are identical in intensity. When this condition holds, the concentrations of the two solutions are inversely proportional to the depths, which are read on the scales of the instrument. The prism

system consists of a double rhomboid reflecting system combined with a bi-prism refracting system; the dividing line is the sharp edge of the upper bi-prism. This new construction allows a dividing line which is almost invisible at the match point and provides an optical system which is completely symmetrical, having neither absorbing cement layers nor selectively reflecting silver surfaces in either path.

The Bausch and Lomb hydrogen-ion colorimeter is designed for the accurate and convenient measurement of pH by the use of standard bi-colour indicators, being equipped with three sets of cups. By removing one pair of cups, pH may

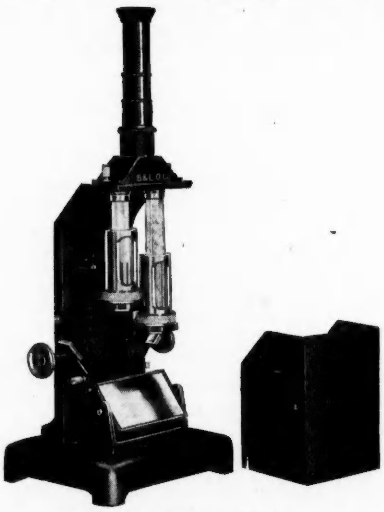

Fig. 7. The Duboscq Colorimeter.
(Bausch and Lomb Optical Co. Ltd.).

be determined with *one*-colour indicators, and by removing two pairs of cups, the instrument may be used as a simple Duboscq colorimeter. The use of the instrument for determining pH requires no special training, or equipment. The instrument determines the ratio of acid colour of indicator to alkaline colour of indicator, and from this ratio the pH is found. The general accuracy of the instrument is greater than any other instrumental colorimetric method, though less than that of the best potentiometric devices. Readings may be duplicated to within 0.03 pH.

Improvements in Spectrometers

A SPECTROMETER (Fig.8) shown by C. F. Casella and Co., Ltd., was very solidly constructed and designed to obtain the utmost possible rigidity and permanence of adjustment.

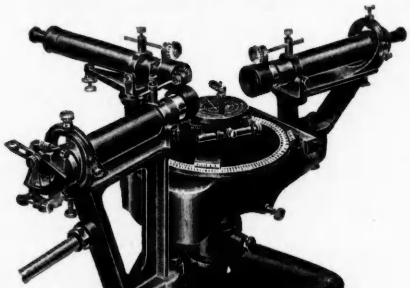

Fig. 8. Improved Spectrometer.
(C. F. Casella and Co., Ltd.).

It was supported on a very heavy cast-iron base into which the main axis of high tensile steel was fitted. The counter-balanced telescope support rotated very easily and smoothly about this axis, and could be set by means of a clamp and fine tangent screw which is conveniently placed underneath the telescope arm. The circle was 8 inches diameter, finely graduated on rustless chromium plate, and was read by means of two verniers to 30 seconds (or to 20 or 10 seconds if specially ordered). This circle could be rotated independently, thus allowing different parts of the dividing to be brought into use. The prism table, which was supported on the usual three levelling screws, was also fitted with coarse and fine adjusting screws, and a pair of verniers, which could be read on the full 8 inch diameter circle, thus allowing the setting of the prism to be made with the same degree of precision as the telescope. Telescopes were supported on heavy ribbed brackets, and adjustments were provided to set the lines of collimation at right angles to the vertical spindle and also in true alignment. The collimator was also fitted with a new type of slit having rustless steel jaws 25 mm. long, with the jaws geometrically mounted and closed by a spring, thus obviating any danger of damage.

An Alarm Recording Pyrometer

IN addition to a complete range of electrical temperature measuring instruments, the Foster Instrument Co., were showing a new alarm recording pyrometer of particular interest to the chemical industry. This instrument (Fig. 9) is of the circular dial type having a 23-hour chart, standard ranges being available covering all normal industrial temperatures, *i.e.*, from −10° to +1,800° C., the sensitive unit being in the form of a resistance bulb, thermocouple or radiation tube according to the range required. When working as a resistance outfit, the Wheatstone bridge is self-contained and a patented automatic voltage compensation is incorporated

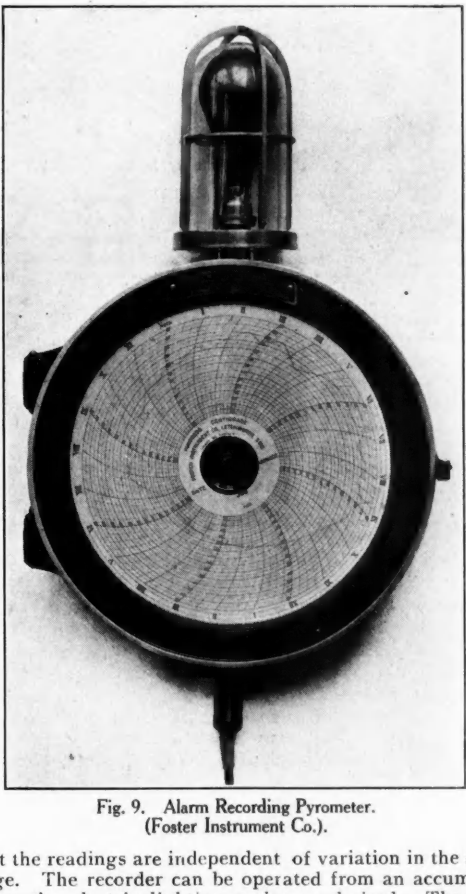

Fig. 9. Alarm Recording Pyrometer.
(Foster Instrument Co.).

so that the readings are independent of variation in the supply voltage. The recorder can be operated from an accumulator or from the electric lighting mains as desired. The movement is of this firm's well-known double-pivoted "Resilia" vibration and shock-proof type and the "dotting" method of producing the record has been adopted thus dispensing with the use of ink. The record is actually produced on

the back of the circular chart which is of translucent paper. In addition to serving as a recorder, the instrument is fitted with an adjustable contact which may be set at any position over the calibrated range and used to operate an alarm signal in the form of a lamp or electric horn. The complete equipment has comparatively few moving parts and has been made extremely simple to sell at a low price whilst having the maximum reliability.

Polariscopes and Refractometers

THE Deerr Darashaw Polariscope shown by Bellingham and Stanley Ltd. (Fig. 10) is built to the specification supplied by Mr. Noel Deerr. This instrument is arranged for use on a wooden table, in which a portion of the table is cut away to accommodate the instrument when it is used in an inclined position so that the observer can sit comfortably at the table, and the observation telescope of the instrument is inclined at a convenient angle. All the optical elements can be removed as separate units, and replaced without difficulty. This is a very great advantage when the instrument is used in a moist and hot climate, as the optical elements can be kept in a desiccator during the season when the instrument is not in use. The sugar scale is on glass, and is read by transmitted light.

Fig. 10. The Deerr Darashaw Polariscope. (Bellingham & Stanley Ltd).

The splash glasses at either end of the trough are mounted in a slide and can be withdrawn for cleaning. The bichromate filter is mounted on the slide and can be inserted when required, or removed. The instrument is constructed without cement, and is therefore particularly suitable for use in the tropics. It should also be noted that the illuminating lamp is mounted directly to the instrument.

A hand refractometer for sugar solutions up to 25 per cent. was also exhibited at this stand. This instrument, little larger than a fountain pen, is designed for the rapid examination of sugar solutions containing up to 25 per cent. total solids by ordinary light. It can be carried in the pocket, and waste liquors and other solutions, examined on the spot. It contains the usual double prism system, object glass, scale and eyepiece, and is adjusted to be correct at 20°C.

Measuring Opacity and Turbidity

THE "R P" differential photoelectric opacimeter (Fig. 11), shown by Technological and Industrial Service, gives in a direct manner the opacity difference of two media (solid or liquid). Being extremely sensitive it is particularly suited to micro-dosing, to the measurement of the turbidity of water and, generally, to determine any opacity difference, however small. The two media to be compared are equally illuminated. After passing through the transparent medium, each beam of light is then directed on to a photoelectric cell. The two cells are balanced, and for two media of the same transparency, they produce in the measurement circuit (*i.e.*, the grid circuit of an electrode valve) equal currents of contrary signs. The electrode valve amplifies the difference between the two photoelectric currents, a difference which is proportional to the transparency difference of the two media. The amplified current flows through a central-zero milli-ammeter. For an equality of transparency the needle is on the zero; and any transparency difference is shown by a proportionate deviation of the needle, in one direction or the other, according to the position of the media relatively to the cells. The difference can then be read directly on the milliammeter scale. This reading, however, is not independent of the light intensity of the lamp illuminating the media, and it is necessary to check, from time to time, the calibration of the instrument. To obtain readings independent of the light intensity of the lamp, the opacimeter is provided with a variable aperture diaphragm ruler, by the displacement of which it is possible to increase proportionately the illuminated area of one of the cells and, consequently, to bring back the milliammeter needle to zero.

A Specific Gravity Balance

A SPECIFIC gravity balance for solids (Fig. 12) by Baird and Tatlock, Ltd., provides a ready means of determining the specific gravity of solids, and is particularly to be recommended where a number of routine determinations are to be made. The sample is simply counter-balanced, no record of its actual weight being required. On then immersing the sample in water the specific gravity is read off directly on the scale of the instrument, which is graduated in 1/100° up to

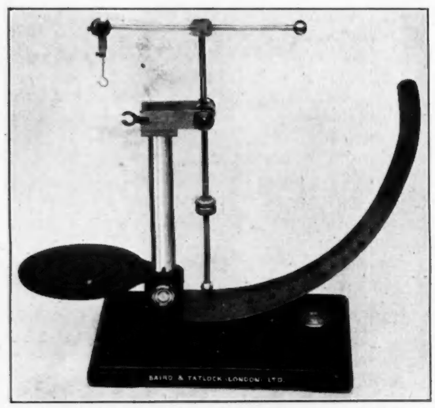

Fig. 12. Specific Gravity Balance for Solids (Baird & Tatlock, Ltd.)

sp. gr. 2.2 and beyond that in 1/20° up to sp. gr. 3.0. It is figured throughout at every 0.1°. The balance is capable of dealing with samples varying between 1 gm. and 7 gm. in weight. Apparatus for determining the combustibility of coke are also exhibited on this stand. In this apparatus a sample of the coke is ignited in a quartz receptacle and its behaviour studied under varied conditions of air supply.

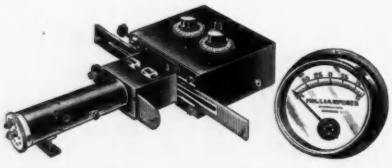

Fig. 11. Differential Photoelectric Opacimeter. (Technological and Industrial Service).

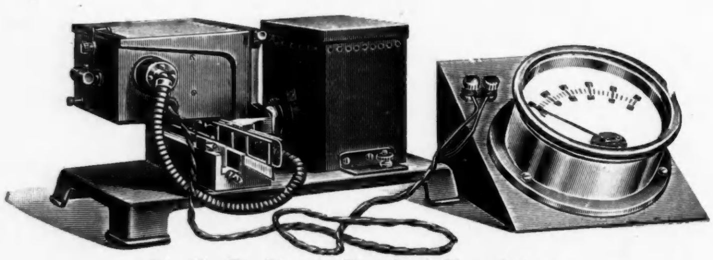

Fig. 13. The Toussaint Photoelectric Photocolorimeter. (Technological and Industrial Service).

Fig. 14. Vacuum Pump.
(Griffin and Tatlock, Ltd.)

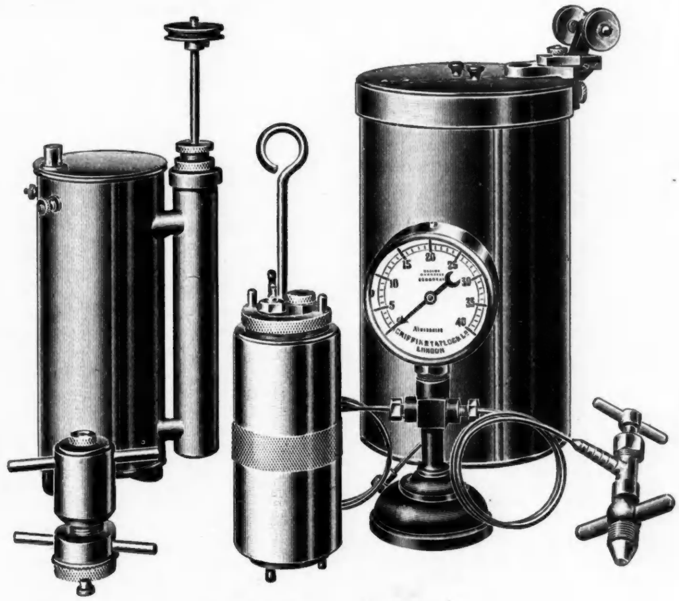

Fig. 16. New Bomb Calorimeter.
(Griffin and Tatlock, Ltd.)

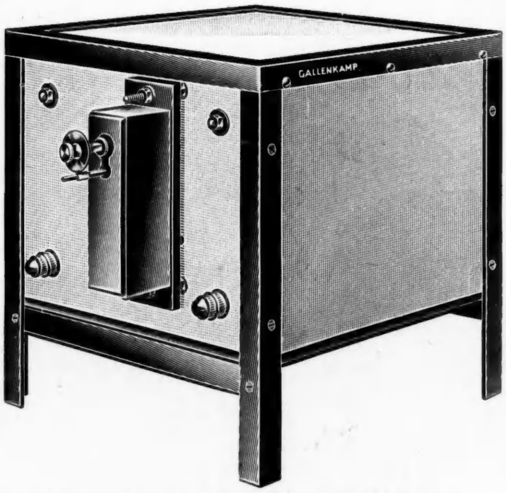

Fig. 15. Electric Furnace with Thermostatic Control
(A. Gallenkamp and Co., Ltd.)

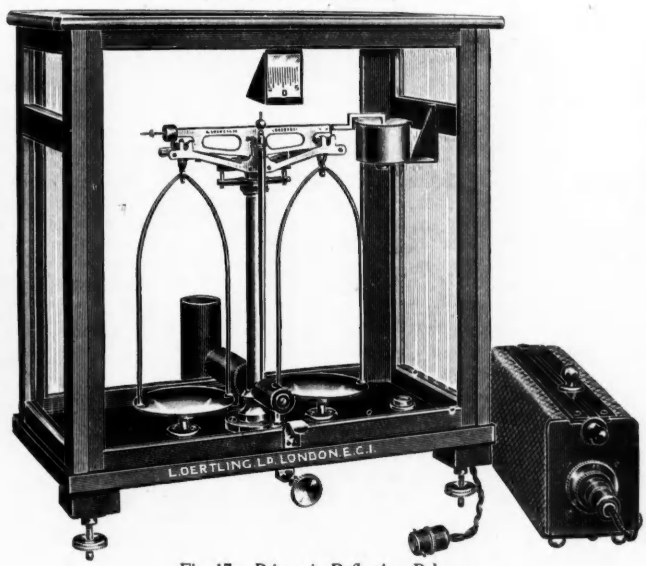

Fig. 17. Prismatic Reflecting Balance.

A Photoelectric Photocolorimeter

THE Toussaint ("T.C.B.") direct reading photoelectric photocolorimeter (Fig. 13), was exhibited by Technological and Industrial Service. This colorimeter entirely eliminates the use of the eye and, consequently, personal factors from photometry and colorimetry. It is designed and constructed to meet the requirements of all those who have to do with photometry and colorimetry, industrially and commercially, and, yet, have need for accurate and incontrovertible measurements. In this instrument a white light—concentrated by a pair of lenses and then corrected, or not, by a coloured filter according to the requirements of the test—is so reflected or diffused by an opaque sample, on so transmitted by a liquid or transparent specimen that, after reflection, diffusion or transmission, it acts on the photoelectric cell placed in a suitable electric circuit. The photoelectric current produed is amplified and passed through a milliammeter. The measurements made with this instrument are relative ones, a sample under test is compared either with a standard or with another sample. Hence, the devices used for the presentation of the samples always provide for the placing, side by side, of two specimens on a slide having fixed stops. By shifting the sample-carrying slide to the right or to the left, in front of the lighting system, the two specimens being compared are brought alternatively, and very quickly, into identical positions relative to the source of light, the coloured screen and the photoelectric cell.

A Modern Bomb Calorimeter

AMONG the many items of interest shown by Griffin and Tatlock, Ltd., was the Griffin-Sutton bomb calorimeter, exhibited in January 1933 only in an experimental form. During the past year, valuable improvements have been incorporated in the light of experience which has emerged as a result of

practical tests and the bomb is now available for general distribution (Fig. 16). Its design is claimed to be most convenient, its distinguishing feature being that the stainless steel bomb can be operated by hand at both ends without the use of cumbrous spanners and jigs. Only those who have worked with the older type of bomb calorimeter can fully appreciate what the statement "by hand" means. When the sample has been introduced into the calorimeter, the bomb assembled and the gas passed in, the internal pressure of the gas effectively seals the bomb. The external shape of the bomb eliminates water pockets and conduces to the rapid attainment of temperature equilibrium, with a consequent gain in the accuracy of analyses. Accuracy obtainable is 0.1 per cent. on the calorific value and 0.05 and 0.1 per cent. respectively on carbon and sulphur contents. The bomb is designed to work in conjunction with a water calorimeter which consists of a large and a small tube joined by horizontal tubes. In the smaller tube an efficient propeller stirrer maintains a continuous circulation of water round the bomb. A thermal shield encloses the water calorimeter and is provided with two jockey pulleys over which the driving belt for the stirrer pulley runs.

Rotary Oil-Sealed Vacuum Pumps

A SECOND item of interest on the same stand was a British made rotary oil-sealed vacuum pump. It may be used for vacuum filtration or as a backing pump for condensation pumps. An interesting feature is the incorporation of a phosphorous pentoxide water vapour trap which is readily accessible for recharging and which eliminates a source of trouble frequently encountered in pumps of this type where the performance rapidly falls off with absorption of water vapour by the oil. A spark vacuum gauge is shown fitted in the illustration and by means of the striæ phenomena, the degree of evacuation can be estimated while exhausting is in progress. The pump is capable of developing a vacuum of about 0.015 mm. mercury. (See Fig. 14.)

Laboratory Electric Furnaces

AN important development in electric furnace control was shown by A. Gallenkamp and Co., Ltd., in the application of thermostatic control up to the maximum temperature which the furnace can reach. The current required to heat a furnace up from cold is considerably more than the furnace requires to maintain a given temperature. With hand control the rheostat must be adjusted at the right moment in order that an excessive rise of temperature with consequent damage of the windings does not follow. Early experiments in this direction were unsatisfactory for various reasons, the chief being the difficulty of obtaining suitable materials for the control element in the furnace. This has to stand up to temperatures up to 1,000 °C. for indefinite periods without corrosion or alteration. These difficulties have now been overcome and a satisfactory control to about ± 3°C. is possible by the use of a nickel-chromium expansion element and a suitable contractor and relay, as illustrated above. When a predetermined temperature is reached the relay opens and connects a resistance in circuit so that the temperature in the furnace falls a few degrees and closes the relay again. The outfit can be applied to almost any type of furnace for temperatures up to 1,000°C., the control element in the furnace taking up no more space than an ordinary thermocouple.

A Prismatic Reflecting Balance

TIME-SAVING features, combined with the highest precision and reliability typify the newest range of balances which were exhibited by L. Oertling Ltd. The No. 53 aperiodic prismatic reflecting balance (Fig. 17) has met with an enthusiastic reception from scientific workers wherever it has been introduced. In this instrument the makers damp the free oscillation of the beam and bring the balance rapidly to rest by means of a special air-damping device. This is standard on newer models and has proved completely reliable in service. In addition they eliminate the use of weights below 0.1 gram, weighings up to 100 mg. (50 mg. plus and minus) being read off an illuminated scale, the enlarged image of which is projected by an electric light and optical system to a convenient position at the top of the balance case. The divisions on the scale, each representing 0.0001 gram, are 1/16th inch apart, and readings to 0.00005 gram (1/32 inch) can thus be obtained with ease. These improvements result in a great saving of time and avoidance of fatigue where many weighings have to be made. Indeed, one user reports that he is obtaining 42 precision weighings per hour.

An erroneous impression still lingers that the finest precision balances are necessarily of Continental make. In point of fact the reputation among scientific workers enjoyed by Oertling instruments is second to none. This firm therefore wishes to point out that its balances are and always have been made in London, and the firm is entirely British in constitution, having no connection with any foreign firm. They make chemical and assay balances of all types, with their appropriate weights, including models of the highest accuracy and also less expensive models for educational use. Such instruments are installed in the leading government, educational and industrial laboratories of Great Britain, the Dominions and Colonies, and also in many foreign countries.

Bin Level Indicator

A SIMPLE and effective device for indicating the level of the contents of a bin or bunker in which powdered or granulous substance is stored (Fig. 18) was also exhibited by Elliott Brothers. This instrument, which is the only one of its kind, has been primarily designed for use with pulverised fuel, but can be satisfactorily operated with practically any powdered or granulous substance that is stored in bins, *e.g.*, chocolate, cement, grain, cereals, flour, etc., and also with small raw coal and coke. The pressure or withdrawal of the pressure, caused by the substance in the bin, operates a diaphragm which is spring-loaded and attached to a plunger, the consequent movement of which, opening or closing a set of contacts, causes the alarm signal to operate indicating that

Fig. 18. The Tollemache Bin Level Indicator. (Elliott Brothers, London, Ltd.)

the contents have reached a predetermined level, the bin being either fully charged or ready for replenishing. The Tollemache bin level indicator is a remarkably simple and effective device. The predetermined position for operating the alarm may be either a high level (as when charging or filling) or a low level (when the bin requires replenishing), or any other level that it may be required to indicate. Serious results, such as a temporary breakdown of the plant, may be caused by the cessation of the fuel supply in pulverised fuel installations. The risk of such breakdowns can be prevented by installing one of these bin level indicators in the fuel storage bunker, which will thus enable a reasonable warning to be given when the supply of fuel is becoming low.

The Chemical Industry in Italy

Reduction in Volume and Value of Products

The whole economic fabric of Italy is based on confidence in the State and in the wisdom of the head of the Government. This is manifested in the strong position of the lira. Like all other countries, Italy has suffered and continues to suffer seriously from the world crisis, but her adverse trade balance is tending to decrease, and the gold holdings of the Bank of Italy have shown a progressive upward tendency. Marked improvement has taken place in the public services and public works of some magnitude are being carried out, while systematic land reclamation and settlement are taking place. Although the growing deficit in the State account is a serious cause for misgiving, the Minister of Finance is satisfied that the annual national savings are sufficient for the needs of to-day and to-morrow.

In a report on "Economic Conditions in Italy," issued by the Department of Overseas Trade (H.M. Stationery Office. 5s. net) Mr. R. M. A. E. Turner, Commercial Counsellor to the British Embassy at Rome, states that the Italian chemical industry comprises 266 limited liability companies, having an aggregate capital of about two milliard lire,* of which by far the most important is the "Montecatini" group with a capital of 500 million lire, and employing in 1932, 21,186 hands and 1,763 office staff. As regards 1932, a further reduction, in both volume and value, of the various products is observed as compared with the years 1929 and 1930. There was a marked falling off in the production of fertilisers for agricultural use, fewer orders were placed for organic chemicals, such as citric and tartaric acids, and tanning extracts.

The Internal Market

The reduced demand of the internal market as well as the important unsold stocks available have caused keener competition among the producers, thereby reducing their already limited profits. In the case of certain chemicals, customs duties were increased with a view to restricting imports of foreign products and protecting the local industry. Exports of Italian chemical products had to face the general economic depression as well as tariff barriers in the export markets.

The production of sulphuric acid (50-52° Be') being strictly dependent on the manufacture of superphosphates, which takes over some 85 per cent., decreased in 1931 by 28 per cent., as compared with the average production during 1929 and 1930. The year 1932 shows a further slight reduction over 1931. The total Italian maximum production of sulphuric acid of 50-52° Be' is about 1.5 million metric tons a year, representing an increase of 100 per cent. over 1918, while the output of the 23 Italian plants producing this acid at 66° Be' is estimated at about 130,000 metric tons yearly.

Production of Sulphuric Acid

The total Italian production of sulphuric acid expressed in 66° Be' is estimated at 600,000 metric tons for 1931, as against 835,000 tons for the two preceding years. The output of nitric acid, having shown a rapid increase during the last 10 years, maintained practically the same level in 1931 and 1932 as compared with 1930. It is obtained largely through the process of oxidising synthetic ammonia in the Montecatini plants, and the maximum quantity of the production is used in the manufacture of ammonia and calcium nitrates. The balance sold on the open market is of about 6,000 metric tons a year. The imports of this acid were of 9-11,000 tons during 1928-1930, 2,000 tons in 1931 and 3,000 tons in 1932.

The production of hydrochloric acid obtained by treating sodium chloride with sulphuric acid, reached 39,500 tons in 1930, representing a slight reduction as compared with the previous years (1928 with 51,900 tons), or about 70 per cent. of the total Italian maximum capacity, which is sufficient to meet the local demand. Boric acid, obtained from natural geysers in Tuscany, is produced in large quantities and there are hopes of the possibility of exports increasing. Data regarding the Italian output of the principal chemical products for the five years between 1927 and 1931 are given in Table I. Complete figures for 1932 are not yet available. No considerable import and export business is done in inorganic chemical products.

TABLE I.

THE ITALIAN CHEMICAL INDUSTRY: PRODUCTION.

Products.	Quantity produced in metric tons. 1928.	1929.	1930.	1931.
Refined boric acid	1,833	2,071	1,381	1,783
Carbonic acid	3,925	3,563	4,056	3,744
Hydrochloric acid	51,987	40,777	39,550	34,934
Nitric acid	29,620	39,367	74,963	60,410
Sulphuric acid	704,100	834,500	831,200	632,540
Alum	1,126	1,106	1,239	1,067
Aniline	991	1,327	1,363	861
Sodium bisulphate	18,619	10,557	9,107	2,722
Borax	4,459	3,232	3,321	3,082
Calcium carbonate	803	1,015	1,567	2,032
Calcium carbide	86,681	84,364	102,600	75,890
Cellulose	2,400	2,484	6,140	6,000
Mineral colours	19,128	18,115	17,736	15,736
Organic colours	6,985	6,992	5,834	5,000
Tannic extracts	77,142	63,867	52,745	49,341
Refined glcerine	1,772	2,596	2,620	3,000
Calcium chlorate	8,662	8,270	9,930	8,957
Caustic soda—solid ...	67,630	76,790	66,710	67,354
,, ,, liquid ...	48,875	49,570	48,428	49,998
Aluminium sulphate ...	2,655	3,230	3,584	3,438
Sodium sulphate anhydrous	18,160	20,290	18,620	18,000
,, ,, crystallised	16,220	16,265	9,930	9,225
Carbon sulphide	15,660	13,763	12,563	13,460
Sodium sulphide	4,300	5,593	4,291	2,473
Superphosphates	1,045,300	1,307,100	1,388,100	802,100
Copper sulphate	121,400	72,500	68,800	77,300

Figures for 1932 are not yet available.

Chemical Fertilisers

Owing to the persistent decrease in the cousumption of fertilisers for agricultural purposes during the years 1930 and 1931, the chemical fertiliser industry has considerably reduced its production mainly to dispose of the abundant unsold stocks. Superphosphates are produced in 87 Italian plants, having a total capacity of over 2 million metric tons a year. The actual output, which appeared to have been more or less stationary at 1,300,000 tons a year during 1927, 1928, 1929, 1930, dropped to 802,100 tons in 1931 and to 609,500 tons in 1932, representing a decrease of over fifty per cent. as compared with the average production of the four years from 1927 to 1930. According to statistics published, however, the Italian consumption of these fertilisers during 1932 showed a satisfactory increase, *i.e.,* from 894,200 tons of 1931 to 1,029,500 in 1932, of which 609,500 tons were delevered by the Montecatini group. It is expected that 1933 will prove a still better year than 1932 as regards consumption of superphosphates. Azotic fertilisers have shown a better tendency as compared with phosphates. The total amount produced in 1932 (206,141 tons) represented an increase of seventeen per cent. over that for 1931 (174,900 tons) of which the share of the Montecatini was 143,106 in 1932 as against 109,067 tons in 1931. The Italian consumption of azotic fertilisers (synthetic) reached 225,495 tons in 1932 as compared with 154,329 in 1931, *i.e.,* an increase of about 46 per cent.

The Italian production of calcium cyanamide was 77,897 tons in 1932 against 88,066 in 1931, while the consumption increased from 78,248 tons in 1931 up to 102,622 tons in 1932, *i.e.,* by 31 per cent. The Italian imports of this product were limited to 4,000 tons in 1932, the balance between production and consumption being met from stocks held over from previous years. The present total producing capacity of the Italian industry expressed in terms of nitrogen has

*The pre-war rate of exchange was £1 sterling = Lire 25.22. After the lira was stabilised in December, 1927, the par rate was £1 sterling = Lire 92.46. As the result of the departure of the United Kingdom from the gold standard the average monthly rate during 1932 was £1 sterling = Lire 68.42.

been estimated at about 80,000 tons a year, of which 50,000 tons are obtained through the ammonia process and 27,000 through the cyanamide treatment, the balance being extracted from by-products of gas and coke ovens, etc. While the Italian imports of these fertilisers are decreasing mainly on account of high tariffs and reduced cost of the local products, Italian exports are tending to increase. All the sales are effected through a Consortium formed in January, 1929, in Milan, and headed by the Montecatini group.

Potash fertilisers are not extensively produced in Italy, and show a reduction from 5,561 tons in 1930 to 4,683 in 1932, of which 3,741 are potash salts and 941 tons "leucite." The Italian consumption is very limited and supplied almost entirely by imports from other countries. The Italian industry is studying the possibility of obtaining potash fertilisers from "leucite" and a plant has just been erected at Civitavecchia for the application of the "Blanc" process.

Copper Sulphate

The production of copper sulphate insecticide for agriculture has shown a considerable increase in 1932 with 99,567 tons as compared with 77,271 in 1931, not reaching, however, the higher levels attained in 1927 and especially in 1928. The Società Anonima Agenzia Vendita Solfato di Rame selling the total production of the Montecatini, the Società Marengo and of the C.I.T.A., delivered 73,684 tons in 1932 against 72,466 in 1931, while outside deliveries were 13,466 tons in 1932 against 13,015 in 1931, and 10,000 tons in the two preceding years. Efforts will doubtless be made to export larger quantities in 1933, and to limit imports as far as possible.

The Italian production of anhydrous sodium carbonate, Solvay soda, having started in 1919, is now in a position to cover the entire local demand. After 1926 the Italian imports of this chemical product ceased entirely, but the output of the two large plants at Rosignano (Pisa) and Monfalcone continued to increase, reaching the highest level in 1929 with about 200,000 tons, but decreasing to 180,000 in 1930. The total capacity of these two plants is about 290,000 tons a year. Over one half of the production of Solvay soda is sold to the local glass, paper, soap, textile, colour, iron and steel industries and the balance is used in the two producing plants for obtaining solid caustic soda and sodium bicarbonate. Noteworthy progress has been effected in the Italian production of sodium sulphate, both anhydrous and crystallised (Glauber salts). Through the constant activity of the local industry, from 1921-1929 the production of this chemical increased from 13,000 to 38,000 tons. Forty plants are engaged in this branch of industry, with a total capacity of over 60,000 tons a year.

Out of the total quantity of sodium sulphate produced in Italy, about three-tenths are used by the producing plants mainly for the manufacture of sodium sulphide, for which a yearly output of some 10,000 tons entirely covering the local demand is required.

Imports of Chemical Products

The imports of chemical and allied products decreased heavily in value last year, as compared with the value of the imports of the two preceding years. The value of the imports of inorganic chemicals fell from 132.6 million lire in 1930 and 73.6 million lire in 1931, to 58.5 million lire in 1932. Imports of organic chemicals fell from 77.4 million lire in 1930 and 59.2 million lire in 1931 to 41.9 million lire in 1932; and those of chemical fertilisers from 163.6 million lire in 1930 and 79.6 million lire in 1931 to 52.5 million lire in 1932.

There was a shrinkage in the value of the imports of medicinal and pharmaceutical products from 61.1 million lire in 1930 and 55.6 million lire in 1931 to 51.4 million lire in 1932. The value of imports of dyestuffs and tanning materials (including colours, paints and varnishes) imported last year was 102.4 milliin lire against 174.9 million lire in 1930 and 138.1 in 1931. The value of the imports of essential oils, perfumery, soap and the like in 1930 was 46.1 million lire, in 1931, 42.4, the value of last year's imports being, however, only 25.8 million lire.

Imports of sulphate of copper last year amounted to 7,482 tons, valued at 10.3 million lire against 8,964 tons valued at 16.3 million lire in 1931. Nitric acid imports increased to 3,487 tons valued at 3.3 million lire last year from 2.072 tons valued at 2.2 million lire in 1931. Those of nitrate of potassium decreased from 2,536 tons in 1931 to 1,076 tons last year.

There were increased imports of some of the chemical fertilisers last year as compared with 1931. Those of potassium fertilisers increased from 16,780 tons to 29,050 tons; while those of calcium cyanide from 70 tons in 1931 to 3,944 tons in 1932.

Imports of super phosphates decreased from 33,529 tons in 1931 to 21,095 tons last year and those of scoriae of dephosphorization and phosphatic slags from 38,885 tons in 1931 to 37,935 tons in 1932. Raw nitrate of soda fell from 56,371 tons in 1931 to 29,732 tons last year. Only 311 tons of sulphate of ammonia were imported last year against 5,788 tons in 1931 and 21,143 tons in 1930.

New Technical Books

ELECTRONS AND WAVES: AN INTRODUCTION TO ATOMIC PHYSICS. By H. Stanley Allen. pp. 336. Macmillan and Co., Ltd. 8s. 6d.

Most books dealing with modern physics fall into one of two classes. They are either of a popular character and avoid all technical difficulties, or they are serious works demanding previous scientific knowledge and mathematical equipment. In writing this book the author has followed a middle course, the subject matter being based on lectures delivered in the University of St. Andrews. The most important recent advances in physical science have been connected with the electrical constitution of matter and the nature of radiation. The title--Electrons and Waves—is meant to include with two concepts of particle and wave, which used to be regarded as forming an antithesis fundamental in all physical theory. It is believed that teachers and others who have not specialised in physics will welcome this account of recent progress. Mathematical symbols have not been entirely eliminated , but their use has been reduced to a minimum, and only the simplest algebraic equation have been employed.

* * *

DIE TECHNIK DER CHEMISCHEN OPERATIONEN. By Dr. W. Bader. pp. 430. Basle: B. Wepf and Cie. Unbound, 18 fr. (Swiss); cloth, 20 fr.

This introductory text-book of chemical engineering is of an unusual but none the less welcome character, and its value to a wide circle of potential readers is certainly not diminished by its essentially non-mathematical treatment. Twenty-seven years of active work in the chemical industry, the greater proportion of which has been spent in England, has evidently brought home to the author the lamentable gaps in the average chemical curriculum. His aim in the present book is consequently the entirely laudable one of taking the more advanced student on a conducted tour of the basic factory operations, explaining in admirably lucid terms the reasons for the preference being given to this or that apparatus for a given operation. His subject matter is divided into eight main sections, each of which is split up into several chapters. The sections deal with dissolving, mixing and separating operations, technology of solids, liquids and gases, heat transference and evaporation technique. Brief consideration is given in conclusion to the technology of high pressure, catalytic operations and automatic control of processes. Not least among the admirable features are the illustrations. Here the author has rightly limited himself exclusively to those of a diagrammatic nature. It would have been fatally easy to draw upon photo. graphs of proprietary makes of apparatus. Such a policy would have been totally irrelevant to the purpose of the work—the inculcation of a fundamental grasp of the underlying principles of chemical engineering operations. As a text-book it is to be wholeheartedly commended to the advanced student with visions of a career in the chemical industries, as well as to the young works chemist who makes the inevitable discovery of a profound ignorance of his job. As the book is written in German, it should be added that the clarity of the style is exceptional and should render the subject matter easily intelligible to any chemist who has been through an average course in technical German. The inexplicable omission of an index is the only serious defect in the work.

Notes and Reports from the Societies

Institute of Fuel

Assessment of Combustible Nature of Coke

A SIMPLE laboratory method for the assessment of the combustible nature of coke was described by Messrs. H. E. Blayden, W. Noble and H. L. Riley, at a meeting of the Institute of Fuel, held at the Chemical Society's Rooms on January 10.

The authors stated that it is well known that cokes may vary very markedly in the readiness with which they react with oxygen. At one extreme there are the very reactive low-temperature cokes which are readily ignited and burn freely, and at the other, certain unreactive oven cokes, some of which are difficult to ignite and burn freely only in a forced draught. The combustible nature of a coke is probably determined largely by (*a*) the physical structure of the coke; (*b*) the allotropic nature of the carbon present; (*c*) the percentage of volatile matter, and (*d*) the nature of the inorganic ash. Although it is possible to determine the magnitude of these separate factors, their individual effect upon the combustible nature of the coke is obscure and it is not possible to predict accurately their combined effect. The increasing demand for screened coke for use in both the cupola and the blast furnace has created a need for an outlet for breeze, and this is being met to a certain extent by the domestic market. The combustible properties of coke for this market are of great importance. Apparatus which gives promise of meeting the above requirement has recently been designed in the laboratory of the Northern Coke Research Committee.

Society of Chemical Industry

South Wales Section : Petroleum Refining

AN interesting paper on petroleum production and refining is to be given before the South Wales Section of the Society of Chemical Industry on January 19 by Dr. A. E. Dunstan, chief chemist of the Anglo-Persian Oil Co. This paper will deal with major problems and there will be exhibited two films dealing with operations in Persia and Iraq. The South Wales Section cordially invites anyone interested to attend the meeting and view the films.

Liverpool and Manchester Sections

THERE was a large gathering at Liverpool University on Friday, January 5, when Dr. L. H. Lampitt, chief chemist of Lyons, Ltd., gave his Jubilee Memorial Lecture on "Some Fundamental Scientific Problems in the Food Industry" before members of the Liverpool and Manchester Sections of the Society of Chemical Industry. Mr. E. Gabriel Jones, chairman of the Liverpool Section, presided and was supported by Dr. J. T. Dunn, president of the Society.

In the course of his lecture, Dr. Lampitt pointed out that much as we know about foodstuffs, there was still a great amount to be learned, particularly to facilitate examination analysis, and evaluation of foods. We had failed to obtain a single evaluation test to indicate the performance of flour when baked. Although there were such tests as those for springiness, staling, etc., little was really known of the processes occurring during staling of bread. Dealing with the question of how the fundamental problems of the food industry could be approached, the lecturer stressed the importance of broadening the distribution of scientific data accumulated in commercial laboratories. Too much secrecy was observed, and the data which was obtained in such laboratories could with advantage be made available to scientific workers without in any way playing into the hands of competitors. More importance should be given in the food industry to the scientific standpoint and a vast amount of work remained to be done, particularly on the fundamental work of analysis. Methods of analysis often had to be devised and tested, and much valuable time lost in doing so, whilst it was possible that much work done in the past was open to suspicion on the ground that the methods employed had not been thoroughly tested for reliability.

At the conclusion of the lecture Professor H. E. Armstrong agreed with the lecturer that these fundamental analyses should be made for the purpose of control. The faulty analyses of which the lecturer spoke meant spending a great deal of time in analytical work, which would otherwise not be necessary. Finally, he proposed a vote of thanks to the lecturer.

Dr. Dunn, seconding the resolution, said Dr. Lampitt had laid his fingers on a very sore point and had shown them what a little they really knew, of the data and chemistry of this subject, and he thought this paper would encourage chemists all over to concentrate more on the fundamental aspects of this subject. The lecturer had laid stress on the great importance of testing a method of analysis and ascertaining whether it was reliable rather than taking it for granted that the method of analysis would be accurate, and would give them the result they wanted. As Dr. Lampitt had pointed out, there was a great deal of unpublished analytical work which, if published, would save a lot of time at present lost in devising methods of analysis.

Prior to the meeting, members of both sections paid a visit to the Aintree factory of Wm. P. Hartley (London and Aintree), Ltd., and at the conclusion of the meeting an informal dinner was held at the University Club, the president of the Society, Dr. J. T. Dunn, being present.

Hull Chemical and Engineering Society

Ships' Compositions

A PAPER on ships' compositions was read before the Hull Chemical and Engineering Society at a meeting held at the Photographic Society's Room, Grey Street, Hull, on January 9, by Mr. H. W. Keenan, the president, Mr. H. R. Woods, F.C.S., being in the chair.

In addition to the material embodied in his paper read before the Oil and Colour Chemists' Association last year, Mr. Keenan dealt with the corrosion of boilers and anti-corrosive boiler compositions. He said that very little in the nature of adverse conditions was sufficient to cause serious corrosion of the metal, a fact which he attributed to accelerated rate of simple reaction at the elevated temperature involved; galvanic action was also a frequent cause of corrosion. The methods adopted to combat corrosion were (1) imposing an electric current from an external source on to a cast iron block set in the water space; (2) affixing zinc plates to the shell, (3) application of a boiler composition. The first method was not always convenient, the second was not always reliable, but the third method was successful and cheap. Mr. Keenan also discussed the interesting consequences of imposing a film of Apexior between the metal and the water. He drew upon the work of his friend, Mr. Norman Swindin, M.I.Chem.E., and made reference to the assistance given by Mr. J. W. Adamson, managing director of J. Dampney and Co., Ltd., Newcastle, showing with the aid of slides that the heat transmission was actually increased by the film.

SOLOCHROME Violet 4RS, a new Imperial Chemical product, yields bright red-violet shades which possess good—very good fastness properties. It is of interest for use in all branches of fast wool dyeing where light fastness is not of prime importance and is used pricipally in the production of compound shades. In this connection it is to be preferred to the less fast acid violets where fastness to milling and potting come into consideration. Solochrome Violet 4RS may be dyed on loose wool and fur required for the manufacture of felt as it withstands the acid planking process. It is of value where chrome dyestuffs are required as ground shades for the production of discharge styles.

Continental Chemical Notes

Acetic acid can be dehydrated by a new continuous process in which the boiling point of water is depressed by a dialkyl carbonate (Ger. Pat. 583,703).

* * *

Agar-agar in sheet form offers advantages over human hair and rayon as the sensitive material for recording atmospheric humidity in hydrographs. It is especially indicated, according to a German contemporary, for the registration of medium and high humidities.

* * *

Intensely deliquescent substances can be filtered and isolated with the utmost ease in a carbon dioxide atmosphere. A simple laboratory apparatus is described and illustrated by G. Roeder in the "Chemiker-Zeitung." A wide-bore glass tube is passed through a hole drilled in a wooden box of convenient size and the lower end inserted in the rubber stopper of a filter flask. The filter funnel itself is inserted through a smaller stopper in the upper end of the glass tube and is therefore located inside the box. The latter, preferably lined internally with paper, is filled to a large extent with solid carbon dioxide. The vessel containing the liquid and the precipitate which requires to be filtered is placed in the remaining space in the box and the precipitate can then be poured upon the filter funnel and washed in the moisture-free, chemically inert atmosphere. After the completion of filtration a desiccator is placed in the box and the filtered substance inserted therein under the protection of the same inert medium.

The Zinkhivdfabriken Smelting A.S., a concern recently formed with a capital of 125,000 crowns, is erecting at Kastrup, near Copenhagen, the first plant for the production of zinc white in Denmark.

* * *

A new double-layered type of metal tubing for chemical plant has been introduced by the Vereinigte Stahlwerke A.G. Pliability and corrosion-resistance are the distinguishing feation a desiccator is placed in the box and the filtered substance mechanical strength.

* * *

Following on systematic tests, recently reported in the "Angewardte Chemie," a 5 per cent. solution of sodium pyroborate has been selected as the best preventative of mould formation on briquettes in which the binding agent is a mixture of milk of lime and e.g. barley flour. This type of vegetable binder is an efficient substitute for pitch. The pyroborate solution completely prevented mould formation on briquettes stored at 20°C. for 21 days.

* * *

Two recently described processes for acetic acid production respectively utilise acetylene and methyl ethyl ketone as starting points. In the former (Ger. Pat. 583,975) which also yields acetaldehyde and acetone, steam and acetylene are reacted with certain acid salts at temperatures at which the latter absorb less than 5 per cent. of water. The second process (Ger. Pat. 583,704) involves oxidation of methyl ethyl ketone in the liquid phase in presence of a catalyst.

News from the Allied Industries

Sugar

Sugar exports from Java for 1933 totalled 1,146,000 tons, which represents a fall of 354,000 tons as compared with 1932. The fall is attributed to the low prices prevailing in the London market, which have made imports into London uneconomic, and to a sharp fall of imports into British India.

Paper

Work is to be resumed at the A. B. Tegefors Verk sulphite mill at Hjerpen, Sweden, which has been idle since October 1, 1931. The company has recently concluded a satisfactory agreement with the workmen. A recent announcement states that the mill will be altered for the production of bleached sulphite pulp, and the production capacity will at the same time be slightly reduced in comparison with the earlier output of unbleached pulp.

Beet Sugar

The West Midland Sugar Co., Ltd., completed its beet campaign this week. The tonnage of beet sliced at the Kidderminster factory is a record. Between £300,000 and £400,000 has been paid to farmers for roots delivered to the factory during the season. The season has been a record, too, for the small quantity of dirt tares, owing to the dry weather, experienced during the harvesting period, and the average crop has shown a satisfactory return to the grower.

Fertilisers

A memorandum strongly protesting against the application made to the Imports Duties Advisory Committee for an increase in the duty upon superphosphates was sent to that body on behalf of the National Farmers' Union of Scotland by Miss A. Maclaren, secretary of the union, on January 5. The memorandum sets forth various objections. It is argued that for some time past arable farming has been carried on with prices for agricultural produce at an uneconomic level, and any rise in production costs due to higher prices for fertilisers would increase considerably the losses incurred in this branch of the industry.

Mineral Oil

The Mexican Government is considering the possibility of developing the oil resources of the country, with the aid of foreign capital, and using the proceeds to refund the national debt. At present negotiations are limited to French bankers, but English and American concerns are reported to be giving the matter their consideration.

Iron and Steel

Business in iron and steel is gradually increasing, and it is anticipated that by the end of the month it will equal, if not surpass, that for December. Business in pig-iron on the whole has been satisfactory. Semi-finished steel producers have good orders in hand. The outlook in the finished steel department is promising.

Carbonisation

Colonel W. A. Bristow, chairman of Low Temperature Carbonisation, Ltd., left London for Doncaster on January 8 to inspect possible pit-head sites in the South Yorkshire coal field for one of the two new plants which the company propose to erect. It was announced last week that the company intend to erect this year two new low temperature carbonisation plants, capable of treating 300,000 tons of coal a year. The cost of the new plants will be some £300,000, and a good deal of this money will be spent in Sheffield on machinery.

Pottery Making

Operatives at two Burslem potteries, numbering seventy, were thrown out of employment on January 5, owing to a fire which destroyed the engine-house which supplied power for the Stanley Pottery and the Bursley Pottery, Ltd., in Dalehall, Burslem. A large quantity of crude oil which is used in connection with the plant became ignited and, but for the prompt arrival of the Stoke City Fire Brigade, both factories would probably have been destroyed. About 500 persons are employed altogether on the two factories, but only the workpeople in certain departments are affected.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

KILNS for the use in the manufacture of lime.—E. G. Spencer and A. Todd. May 24, 1932. 403,707.

PHENOLIC COMPOUNDS, de-oxidation.—Gas Light and Coke Co., R. H. Griffiths and R. N. B. D. Bruce. May 26, 1932. 403,708.

ACIDYLATION.—H. Dreyfus. June 17, 1932. 403,646.

THERMAL TREATMENT of hydrocarbons.—J. Y. Johnson (I. G. Farbenindustrie). June 18, 1932. 403,647.

SOLID GELLED non-drying vegetable oils and compositions containing them.—M. G. Thomson, A. C. Hetherington, S. A. Sim and Imperial Chemical Industries, Ltd. June 18, 1932. 403648.

ABSORPTION OF OLEFINES and the manufacture of oxygenated organic compounds therefrom.—British Celanese, Ltd., H. Dreyfus, and W. H. Groombridge. June 23, 1932. 403,654.

ALUMINIUM SULPHATE from clay, production.—W. W. Groves (Merrimac Chemical Co., Inc.). June 23, 1932. 403,657.

CELLULOSE ESTER or other compositions.—E. I. Du Pont de Nemours and Co. June 25, 1931. 403,667.

LEATHER DYES, manufacture.—Imperial Chemical Industries, Ltd., M. Mendoza and J. Hannon. June 27, 1932. 403,672.

SODIUM ALUMINATE, manufacture.—Aluminium, Ltd. March 28, 1932. 403,719.

LAMINATED NON-SPLINTERING GLASS, manufacture.—A. Renfrew, J. S. B. Fleming, and Imperial Chemical Industries, Ltd. June 30, 1932. 403,723.

ARTIFICIAL MATERIALS, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). July 13, 1932. 403,750.

ALDEHYDES of the benzanthrone series, manufacture.—A. Carpmael (I. G. Farbenindustrie). July 16, 1932. 403,754.

CHROME YELLOW COLOURS stable to light, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Aug. 8, 1932. (Cognate application, 29994/32.) 403,762.

COMBUSTION OF FUELS, method for improving.—E. Lubovitch, Aug. 27, 1931. 403,770.

CONVEYANCE of non-homogenous mixtures.—F. Uhde. Sept. 8, 1931. 403,772.

CONVERTING salt mixtures containing ammonium chloride into a granular form.—J. Y. Johnson (I. G. Farbenindustrie). Sept. 29, 1932. 403,781.

UNSATURATED KETONES, process for the manufacture.—Schering-Kahlbaum Akt.-Ges. March 11, 1932. 403,838.

SENSITISING silver halide emulsions.—I. G. Farbenindustrie. March 10, 1932. 403,840.

DYES AND IMTERMEDIATES therefore, manufacture.—I. G. Farbenindustrie. March 18, 1932. 403,845.

CELLULOSE DERIVATIVES, manufacture of films.—Deutsche Celluloid-Fabrik. April 20, 1932. 403,851.

MAGNESIUM HYDROXIDE, processes for making.—American Zinc, Lead and Smelting Co. May 24, 1932. 403,860.

VAT DYESTUFFS, manufacture.—I. G. Farbenindustrie. May 4, 1932. 403,862.

HIGH MOLECULAR ORGANIC ESTERS, manufacture.—Henkel et Cie, Ges. Jan. 4, 1932. 403,883.

PRODUCTION OF POWDER from ductile metals, especially magnesium.—I. G. Farbenindustrie. July 22, 1932. 403,888.

MAGNESIUM and magnesium alloys, melting and purifying.—Dow Chemical Co. Aug. 3, 1932. 403,891.

DERIVATIVES of di- or trimethoxy- and -ethoxy-benzoic acids, process for manufacture.—H. J. W. France (F. Hoffmann-La Roche & Co. Akt.-Ges. June 16, 1933. 403,892.

SYMMETRICAL di-(arylamino)-hydroxybenzenes, manufacture.—I. G. Farbenindustrie. Sept. 3, 1932. 403,915.

SYMMETRICAL di-(arylamino)-hydroxybenzenes, manufacture.—I. G. Farbenindustrie. Sept. 9, 1932. 403,917.

ALKALI ALCOLATES, manufacture.—I. G. Farbenindustrie. Sept. 27, 1932. 403,921.

Applications for Patents

REFINING TREATMENT of hydrocarbon liquids.—Anglo-Persian Oil Co., Ltd., S. F. Birch and F. B. Thole. Jan. 3. 190.

ORGANIC BISMUTH SALTS, manufacture.—Boot's Pure Drug Co., Ltd., A. P. T. Easson, and F. L. Pyman. Jan. 2. 152.

FILMS, etc., from vinyl resins, production.—Carbide and Carbon Chemicals Corporation. Jan. 2. (United States, Jan. 25, '33). 145.

FILMS, etc., from vinyl resins, production.—Carbide and Carbon Chemicals Corporation. Jan. 2. (United States, Nov. 22, '33). 146.

AZO DYESTUFFS, etc., manufacture.—Compagnie Nationale de Matières Colorantes et Manufactures de Produits Chimiques du Nord Réunies Etablissements Kuhlmann. Jan. 2. (France, April 19, '33.) 161.

CATALYTICALLY treating mineral oils, etc.—C. J. Greenstreet. Jan. 2. 118.

DIOXAZINE COMPOUNDS, manufacture.—I. G. Farbenindustrie. Jan. 1. (Germany, Dec. 31, '32.) 80.

DIOXAZINE COMPOUNDS, manufacture.—I. G. Farbenindustrie. Jan. 1. (Germany, Aug. 15, '33.) 81.

PREPARING SUBSTANCE from amino aliphatic acid and phenylquinoline orthocarboxylic acid.—H. G. Jacubson. Jan. 2. (Germany, Jan. 2, '33.) 181.

COMPOUNDS of hydrouracile series, manufacture.—F. Merck, K. Merck, L. Merck, and W. Merck. Jan. 2. (Germany, Jan. 3, '33.) 160.

METHOD for producing a concentrate of chrome-ores.—Neptunia Akt.-Ges. Jan. 1. (Austria, Nov. 4, '33.) 57.

FINELY-DIVIDED CALCIUM CARBONATE, production.—Pittsburgh Plate Glass Co. Jan. 2. (United States, Jan. 21, '33.) 148.

HYDROGENATION of amides.—Röhm and Haas Co. and W. W. Triggs. Jan. 2. 128.

INDIGOID DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. Jan. 3. (Switzerland, Jan. 4, '33.) 237.

SULPHONATION PRODUCTS from mineral oils, etc., production.—E. A. Wernicke. Jan. 2. (Germany, Jan. 11, '33.) 186.

New Companies Registered

Anglo-Jugo-Slavian Lignite Co., Ltd., St. Michaels House, Church Alley, Basinghall Street, E.C.2. Registered December 20. Nominal capital £100. To acquire mines, lands and mineral properties, and grants, concessions, leases, claims and licences in Jugo-Slavia or elsewhere; to prospect, explore and work claims or mines, and drill and quarry for coal and lignite, and manufacturers of by-products therefrom, oil distillers, tar, dye and chemical manufacturers, etc. A subscriber: Charles B. Sippe, D. W. Lebitch.

Anglia Match Co., Ltd.—Registered January 5. Nominal capital £10,000 in £1 shares. Manufacturers, importers and exporters of and dealers in matches, etc. Subscribers: R. A. Curtis, 7-8 Gt. Winchester Street, E.C.2., and Rose Elman.

British Processes Syndicate, Ltd., 355 Bank Chambers, 329 High Holborn, London, W.C.1. Registered December 20. Nominal capital £5 in 1s. shares. Objects: To acquire interests in and turn to account inventions relating to anodising, treating or colouring aluminium and aluminium alloy's and castings by electrolysis or any other method, etc. Directors: William F. Harkness, James Horsfall, John M. Richard, Sidney R. Sheppard, Paul J. White.

Deason Chemical Co., Ltd.—Registered December 29. Nominal capital £100 in £1 shares. Chemical manufacturers and distillers, etc. Subscribers: R. H. Dennison, Oaklands, 1024 Shields Road, Newcastle-on-Tyne, and G. H. M. Graham.

Feroil, Ltd, 26 North John Street, Liverpool.—Registered January 8. Nominal capital £100 in £1 shares. To enter into an agreement with W. Eilian Roberts, acting as receiver for the debenture holder of the Northern Refining and Manufacturing Co. (Lancashire), Ltd. (in liquidation) for the purchase of the registered trade mark "Feroil," and to carry on the business of export and import merchants, oil refiners and blenders, importers and exporters of petroleum products, manufacturers of waxes, soaps, greases, etc. Directors: O. R. Williams, 66 Laurel Road, Fairfield, Liverpool, and Mrs. E. J. Williams.

Hydrogeneration Products, Ltd.—Registered in Dublin December 27. Nominal capital £1,300 in £1 shares. Chemical engineers, pharmaceutical, manufacturing and general chemists and druggists, to carry out electrical and chemical research, etc. Subscribers: A. Fairclough, 25 Chelmsford Avenue, Ranelagh, Dublin, and F. J. Dunn.

Indurite Moulding Powders, Ltd., Progress Works, Whittaker Street, Radcliffe, Lancs.—Registered December 21. Nominal capital £1,000 in £1 shares. Manufacturers of synthetic resins, moulding powders, varnishes, lacquers, gums, laminated sheets, boards and other materials, and any other type of synthetic compound, etc. Directors: R. S. Howarth, 45 Bury and Bolton Road, Radcliffe, Lancs., W. Lord, and L. Clegg.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

SATISFACTORY business has been transacted in the home chemical market during the week. Acetone, formaldehyde, formic acid and oxalic acid have been in good demand and there has been an increased interest in acetic acid, ammonium chloride, salammoniac and sodium sulphide. Offers of cheap Japanese arsenic have affected the arsenic position, and the copper sulphate market remains dull. Inquiry for potassium compounds is limited, but there is a quiet steady trade in fertilisers. Increased inquiries have been received on the export side of the coal tar products market and business at home has been good. Sales of cresylic acid are increasing and there is a good demand for creosote oil, naphthalene, and solvent naphtha. Coal tar pitch is still the least satisfactory item, but some slight improvement has been shown lately. There is likely to be a large demand for refined coal tar during the coming season. Conditions in the pharmaceutical chemicals market show little change. There is a steady though limited demand for a number of products, including aspirin, lactic acid, cream of tartar, citric and tartaric acids. Dull items are salicylic acid and salicylates.

MANCHESTER.—Business on the Manchester chemical market this week seems now to have got fairly fully into its stride again after the holiday interruption, and, on the whole, conditions are much the same as they were about midway through last month. From the point of view of actual new business, the bulk of the transactions during the past week have been in respect of near delivery parcels, although traders report a sprinkling of contract commitments. The majority of the alkali products are moving in fair quantities, and moderate deliveries are reported in the case of the potash materials and of general chemicals, with price changes as compared with a week ago few and far between. In the by-products section of the market, trading conditions in the case of the light products are fairly active, and whilst toluol is somewhat easier on balance other prices are firm. Carbolic crystals are in good demand and after the recent reduction quotations are tending higher again, though the crude material has not so far changed. Offers of crude tar this week have been on an easier basis.

LONDON.—The demand for chemicals generally is good, with prices firm in all directions. The market for coal tar products is firm, there being a fairly steady demand, with no change in prices from last week.

SCOTLAND.—There is something hopeful about the Scottish heavy chemical market at the present time and inquiries for forward supplies and definite business are promised.

General Chemicals

ACETONE.—LONDON : £65 to £68 per ton; SCOTLAND : £66 to £68 ex wharf, according to quantity.

ACID, ACETIC.—Tech. 80%, £38 5s. to £40 5s.; pure 80% £39 5s.; tech., 40%, £20 5s. to £21 15s.; tech., 60%, £28 10s. to £30 10s. LONDON : Tech., 80%, £38 5s. to £40 5s.; pure 80%, £39 5s. to £41 5s.; tech., 40%, £20 5s. to £22 5s.; tech., 60%, £29 5s. to £31 5s. SCOTLAND : Glacial 98/100%, £48 to £52; pure 80%, £39 5s.; tech. 80%, £38 5s. d/d buyers' premises Great Britain. MANCHESTER : 80%, commercial, £39; tech. glacial, £52.

ACID, BORIC.—SCOTLAND : Granulated commercial, £26 10s. per ton; B.P. crystals, £35 10s.; B.P. powder, £36 10s. in 1-cwt. bags d/d free Great Britain in 1-ton lots upwards.

ACID, CHROMIC.—10½d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—LONDON : 9½d. per lb.; less 5%. MANCHESTER : 9½d.

ACID, CRESYLIC.—97/99%, 1s. 1d. to 1s. 7d. per gal.; 98/100%. 1s. 5d. to 2s.

ACID, FORMIC.—LONDON : £47 10s. per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND : Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE : Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £48; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £53; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works, according to district and quality. SCOTLAND : 80°, £23 ex station full truck loads.

ACID, OXALIC.—LONDON : £47 17s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND : 98/100%, £49 to £52 ex store. MANCHESTER : £49 to £54 ex store.

ACID, SULPHURIC.—Average prices f.o.r. British makers' works, with slight variations owing to local considerations; 140° Tw. crude acid, £3 per ton; 168° Tw. arsenical £5 10s.; 168° Tw. non-arsenical, £6 15s. SCOTLAND : 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—LONDON : 11½d. per lb. SCOTLAND : B.P. crystals, 11d., carriage paid. MANCHESTER : 1s.

ALUM.—SCOTLAND : Lump potash, £9 per ton ex store.

ALUMINA SULPHATE.—LONDON : £7 10s. to £8 per ton. SCOTLAND : £8 to £8 10s. ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND : 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND : 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND : Lump, £32 per ton; powdered, £34, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—£37 to £45 per ton, carriage paid. LONDON : Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND : British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

ANTIMONY OXIDE.—SCOTLAND : Spot, £26 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden 6½d. to 1s. 1½d. per lb.; crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC.—LONDON : £16 10s. c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND : White powdered, £23 ex wharf. MANCHESTER : White powdered Cornish, £21 at mines.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.r. London.

BLEACHING POWDER.—Spot 35/37% £7 19s. per ton d/d station in casks, special terms for contract. SCOTLAND : £8 in 5/6 cwt. casks for contracts over 1934/1935.

BORAX, COMMERCIAL.—Granulated, £15 10s. per ton; powder, £17 packed in 1-cwt. bags, carriage paid any station Great Britain. Prices are for 1-ton lots and upwards.

CADMIUM SULPHIDE.—2s. 7d. to 2s. 11d.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums.

CARBON BISULPHIDE.—£30 to £32 per ton, drums extra.

CARBON BLACK.—3¾d. to 5d. per lb. LONDON : 4½d. to 5d.

CARBON TETRACHLORIDE.—£41 to £46 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K. Green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 3¼d. per lb. Liquor, £19 10s. per ton d/d.

COPPERAS (GREEN).—SCOTLAND : £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—LONDON : £3 19s. per cwt.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON : £27 per ton. SCOTLAND : 40%, £28 ex store.

LAMPBLACK.—£45 to £48 per ton.

LEAD ACETATE.—LONDON : White, £34 10s. per ton; brown, £1 per ton less. SCOTLAND : White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER : White, £34 to £36; brown, £32

LEAD NITRATE.—£28 per ton. MANCHESTER : £27 10s. to £28.

LEAD, RED.—SCOTLAND : £25 10s. to £28 per ton d/d buyer's works.

LEAD, WHITE.—SCOTLAND : £39 per ton, carriage paid. LONDON : £37 10s.

LITHOPONE.—30%, £17 10s. to £18 per ton.

MAGNESITE.—SCOTLAND : Ground Calcined £9 per ton ex store.

METHYLATED SPIRIT.—61 O.P. Industrial, 1s. 6d. to 2s. 1d. per gal. Pyridinised Industrial, 1s. 8d. to 2s. 3d. Mineralised, 2s. 7d. to 3s. 1d. 64 O.P. 1d. extra in all cases. Prices according to quantities. SCOTLAND : Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NICKEL AMMONIUM SULPHATE.—£49 per ton d/d.

NICKEL SULPHATE.—£49 per ton d/d.

PHENOL.—8½d. to 9d. per lb. without engagement.

POTASH, CAUSTIC.—LONDON : £42. MANCHESTER : £41.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. net d/d U.K. Discount according to quantity. Ground 5½d. LONDON : 5d. per lb. with usual discounts for contracts. SCOTLAND : 5d. d/d U.K. or c.i.f. Irish Ports. MANCHESTER : 5d.

POTASSIUM CHLORATE.—LONDON : £37 to £40 per ton. SCOTLAND : 99¾/100%, powder, £37. MANCHESTER : £38.

POTASSIUM CHROMATE.—6¼d. per lb. d/d U.K.

POTASSIUM NITRATE.—SCOTLAND : Refined Granulated £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¾d. to 9d. per lb. SCOTLAND: B.P. crystals, 8½d. MANCHESTER: Commercial, 8¼d. to 8¾d. according to quantity in 2-cwt. drums; B.P., 9d. to 9¼d. according to quantity in 1-cwt. drums.

POTASSIUM PRUSSIATE.—LONDON: 8½d. to 8¾d. per lb. SCOTLAND: Yellow spot material, 8½d. ex store. MANCHESTER: Yellow, 8½d.

SALAMMONIAC.—First lump spot, £42 17s. 6d. per ton d/d in barrels.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags, special terms for contracts.

SODA, CAUSTIC.—Solid 76/77° spot, £14 5s. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 15s. in casks, Solid 76/77%, £14 10s. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 10s. contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£22 per ton. LONDON: £23.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: Refined recrystallised £10 10s. ex quay or station. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount according to quantity. Anhydrous, 5d. per lb. LONDON: 4d. per lb. net for spot lots and 4d. per lb. with discounts for contract quantities. SCOTLAND: 4d. delivered buyer's premises with concession for contracts. MANCHESTER: 4d. net.

SODIUM BISULPHITE POWDER.—60/62%, £16 10s. per ton d/d 1-cwt. iron drums for home trade.

SODIUM CARBONATE (SODA CRYSTALS).—SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality 7s. 6d. per ton extra. Light Soda Ash £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£32 per ton.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £15 ex station, 4-ton lots. MANCHESTER: Commercial, £9 5s.; photographic, £15.

SODIUM NITRATE.—LONDON: Spot, £18 to £20 per ton d/d station in drums.

SODIUM PERBORATE.—LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£12 10s. per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4¾d. to 5¾d.

SODIUM SILICATE.—140° Tw. Spot £8 5s. per ton d/d station, returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d. SCOTLAND: English material £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground Spot, £3 15s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 2s. 6d. d/d buyer's works on contract, min. 4-ton lots. Spot solid 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM SULPHITE.—Pea crystals spot, £13 10s. per ton d/d station in kegs. Commercial spot, £9 10s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £15 10s. per ton f.o.b.

SULPHUR.—£11 per ton. SCOTLAND: Flowers, £11; roll, £10 10s.; rock, £9; ground American, £10 ex store.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P. £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 4s. 3d. to 4s. 5d. per lb.

Coal Tar Products

ACID, CARBOLIC.—Crystals, 8½d. to 8¾d. per lb.; crude, 60's, 2s. 4d. to 2s. 5d. per gal. MANCHESTER: Crystals, 9d. per lb.; crude, 2s. 5d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d. to 2s. 7d.

ACID, CRESYLIC.—90/100%, 1s. 8d. to 2s. 3d. per gal.; pale, 98%, 1s. 6d. to 1s. 7d.; according to specification; refined, 1s. 10d. to 2s. LONDON: 98/100%, 1s. 3d.; dark, 95/97%, 11d. SCOTLAND: Pale, 99/100%, 1s. 3d. to 1s. 4d.; 97/99%, 1s. to 1s. 1d.; dark, 97/99%, 11d. to 1s.; high boiling acid, 2s. 6d. to 3s.

ANTHRACENE OIL.—Strained, 4½d. per gal.

BENZOL.—At works, crude, 10d. to 10½d. per gal.; standard motor 1s. 5d. to 1s. 5½d.; 90%, 1s. 5½d. to 1s. 6d.; pure, 1s. 8½d. to 1s. 9d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d. to 1s. 7½d.; 90%, 2s. 0½d. to 2s. 1½d.

CREOSOTE.—B.S.I. Specification standard, 3¼d. to 3½d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 3d. to 3¼d. f.o.r. North; 4d. to 4½d. London. MANCHESTER: 3d. to 4¼d. SCOTLAND: Specification oils, 3½d. to 4d.; washed oil, 3¾d. to 4d.; light, 3½d.; heavy, 4½d. to 5d.

NAPHTHA.—Solvent, 90/160%, 1s. 6d. to 1s. 7d. per gal.; 95/160%, 1s. 8d. to 1s. 9d.; 99/190%, 11d. to 1s. 1d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. SCOTLAND: 90/160%, 1s. 3d. to 1s. 3½d.; 90/190%, 11d. to 1s. 2d.

NAPHTHALENE.—Crude, Hot-Pressed, £6 1s. 3d. per ton. Flaked £10 per ton. Purified crystals, £9 15s. per ton in bags. LONDON: Fire lighter quality, £3 to £3 10s.; 74/76 quality, £4 to £4 10s.; 76/78 quality, £5 10s. to £6. SCOTLAND: 40s. to 50s.; whizzed, 70s. to 75s.

REFINED COAL TAR.—SCOTLAND: 4d. per gal.

TOLUOL.—90%, 2s. 9d. to 2s. 10d. per gal.; pure, 3s. 3d.

XYLOL.—Commercial, 2s. 9d. to 2s. 10d. per gal.; pure, 3s.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex Toluol).—1s. 9½d. per lb.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100% d/d buyer's works.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra.

BENZIDINE BASE.—Spot, 2s. 5d. per lb. 100% d/d buyer's works.

p-CRESOL 34-5° C.—2s. per lb. in ton lots.

m-CRESOL 98/100%.—2s. 3d. per lb. in ton lots.

DICHLORANILINE.—2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C. 9½d.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—Spot, £78 15s. per ton in paper bags; £79 5s. in casks, in 1-ton lots.

α-NAPHTHYLAMINE.—Spot, 11½d. per lb., d/d buyer's works.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.

o-NITRANILINE.—5s. 10d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. per lb.; 5-cwt. lots, drums extra.

NITRONAPHTHALENE.—9d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb.

o-TOLUIDINE.—Spot, 9½d. per lb., drums extra, d/d buyer's works.

p-TOLUIDINE.—Spot, 1s. 11d. per lb., d/d buyer's works.

m-XYLIDINE ACETATE.—4s. 3d. per lb.

Wood Distillation Products

ACETATE OF LIME.—Brown, £9 to £10. Grey, £16 to £17. Liquor, brown, 30° Tw., 7d. to 8d. per gal. MANCHESTER: Brown, £9 10s.; grey, £16.

ACETIC ACID, TECHNICAL, 40%.—£17 to £18 per ton.

AMYL ACETATE, TECHNICAL.—95s. to 110s. per cwt.

CHARCOAL.—£6 10s. to £10 per ton.

WOOD CREOSOTE.—6d. to 2s. 6d. per gal., unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. to 4s. per gal. Solvent, 3s. 9d. to 4s. 9d. per gal.

WOOD TAR.—£2 10s. to £6 per ton.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Home, £7 2s. 6d. per ton; export, nominal, £6 12s. 6d. f.o.b. U.K. ports in single bags.

CYANAMIDE.—£7 3s. per ton, carriage paid to railway station.

NITRATE OF SODA.—£7 16s. per ton nearest station.

NITRO-CHALK.—£7 5s. per ton nearest station.

CONCENTRATED COMPLETE FERTILISERS.—£10 15s. to £11 6s. per ton according to percentage of constituents.

NITROGEN PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton according to percentage of constituents.

Latest Oil Prices

LONDON.—Jan. 10.—LINSEED OIL was steady. Spot, £19 (small quantities 30s. extra); Jan., £17 10s.; Jan.-April, £17 12s. 6d.; May-Aug., £18 2s. 6d.; Sept.-Dec., £18 12s. 6d., naked. RAPE OIL was slow. Crude extracted, £25; technical refined, £26 10s., naked, ex wharf. COTTON OIL was dull. Egyptian crude, £13 10s.; refined common edible, £17; and deodorised, £18 10s., naked, ex mill (small lots 30s. extra). TURPENTINE was steady. American, spot, 44s. 6d. per cwt.

HULL.—LINSEED OIL.—Spot quoted £18 10s. per ton; Jan., £18; Jan.-April, £18 5s.; May-Aug., £18 10s. COTTON OIL.—Egyptian crude, spot, £13 10s.; edible refined, spot, £16; technical, spot, £16; deodorised, £18, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £17, naked. GROUNDNUT OIL.—Extracted, spot, £19 10s.; deodorised, £23 10s. RAPE OIL.—Extracted, spot, £24; refined, £25 10s. SOYA OIL.—Extracted, spot, £17 5s.; deodorised, £20 5s. per ton. COD OIL, 21s. per cwt. CASTOR OIL.—Pharmaceutical, 35s. 6d.; first, 30s. 6d.; second, 27s. 6d. per cwt. TURPENTINE.—American, spot, 46s. 6d. per cwt.

From Week to Week

AN INDEX TO VOLUME XXIX of THE CHEMICAL AGE is published with this issue. It will be found inside the back cover, whence it can readily be detached for binding purposes.

THE NAME of Haughton's Patent Metallic Packing Co., Ltd., of St. Mary-at-Hill, London, E.C., has been shortened to Haughton's Metallic Co., Ltd.

MCKESSON AND ROBBINS, LTD., manufacturing chemists, etc., 21 Mincing Lane, E.C., have increased their nominal capital by the addition of £900 in £1 ordinary shares beyond the registered capital of £100.

PROFESSOR H. BRIGGS, Hood Professor of Mining, Edinburgh University, and Professor of Mining at the Heriot-Watt College, is to act as chairman of the technical committee which the Scottish National Development Council is to constitute to inquire into the question of the production of oil from coal and shale.

THE DUNDAS ENGINEERING CO., Grangemouth, has received a £1,000 order for three large condensers for the factory of Imperial Chemical Industries, Ltd., at Huddersfield. The Dundas Co. is responsible for the installation of condensing plant at the Scottish Dyes Factory, Earl's Road, Grangemouth, a subsidiary of I.C.I.

OWING TO SUDDEN DISPOSITION, Mr. Noel Heaton was unable to deliver his paper before the joint meeting of the Bristol Section and Plastics Group of the Society of Chemical Industry and the local branch of the Oil and Colour Chemists' Association on January 11. Arrangements were made for Dr. J. O. Cutter to read a paper on "Modern Ideas on Polymerisation."

THE COUNCIL of the Institution of the Rubber Industry has decided to award the Colwyn Gold Medal for 1934 to Dr. O. de Vries, until recently director of the Central Rubber Station, Buitenzorg. The first medal was awarded to Professor G. Stafford Whitby for his scientific work in connection with rubber manufacture, and last year the medal was awarded to Mr. W. H. Paull for his work in connection with tyre manufacture.

ON THE OCCASION of his 70th birthday, Dr. Arthur D. Little, on December 15, was presented by his staff with a specially bound and inscribed volume of the Morse Collection of Japanese Potteries. The presentation was made by Mr. R. C. Griffin, director of tests, and a member of the board of directors of Arthur D. Little, Inc. Mr. Griffin is a son of Mr. Roger B. Griffin, Dr. Little's original partner when the organisation was formed as Griffin and Little in 1886.

A MEMORIAL IS TO BE ERECTED at Nottingham to the memory of the late Lord Trent and in recognition of his great benefactions to the city. The general purposes committee of the corporation is shortly to submit a proposal to the council. The type of memorial has not yet been settled, but it may take the form of a bust. The council of University College, the buildings and site of which were given by Lord Trent, is also to honour his memory by placing his portrait in oils, along with a plaque, in the great hall of the college.

NOTICE WAS GIVEN in the "London Gazette" of January 9 of the passing of the following resolutions at an extraordinary general meeting of Milton Sales, Ltd., on December 27: "That it is expedient to effect an amalgamation of this company with Milton Proprietary Limited, and with a view thereto that the company be wound up voluntarily; and that Mr. A. E. Jones, of Price, Waterhouse & Co., 3 Frederick Place, Old Jewry, London, E.C.2, be appointed liquidator."

REPRESENTATIONS HAVE BEEN MADE to the Board of Trade under Section 10 (5) of the Finance Act, 1926, for the exemption of Cetyl alcohol from Key Industry Duty under Section 1 of the Safeguarding of Industries Act, 1921, as amended by the 1926 Act. The ground of the misrepresentation is that the material is not made, and is not likely to be made, in any of the British Dominions in substantial quantities, having regard to the requirements of the United Kingdom. Communication on the subject should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, not later than February 8.

THE INQUEST ON THREE MEN employed in the experimental department of the British Celanese factory at Spondon, near Derby, who died in November, has been fixed by the Derby coroner for Tuesday, January 16. The men were John Newman Wade, of Spondon; Elijah Gibson, of Marehay; and Arthur Sheldon, of Long Eaton. Two other employees died shortly before these, but it was not considered necessary to hold inquests on them. When the matter was raised in the House of Commons early in December the Home Secretary (Sir John Gilmour) said that full inquiries were in progress, and meanwhile, the manufacturing process in which the men were employed had been entirely discontinued.

MR. J. P. E. WALKER has been appointed a director of the Avon India Rubber Co., Ltd.

L. OERTLING, LTD., are holding an exhibition of balances at the Royal Victoria Hotel, Sheffield, from January 23 to 26.

NEGOTIATIONS BETWEEN GERMANY AND CHILE for the conclusion of a commercial treaty, providing among other matters an increase of the import quota for Chilean nitrate to Germany, are practically completed.

MR. JAMES AITKIN, a retired chemical manufacturer, of Widnes, has died at Penketh, near Warrington. Mr. Aitkin, who was 87, detested modern methods of transport and was regularly seen going into Warrington in a horse-drawn carriage.

THE NOMINAL CAPITAL of the British Titan Products Company, Ltd., manufacturing chemists, pigment manufacturers, etc., 95 Gresham Street, E.C.2, has been increased by the addition of £175,000 in £1 "A" shares beyond the registered capital of £150,000.

MR. R. A. MURRAY, for two years adviser to the India Tyre and Rubber Co., Ltd., Inchinnan, Renfrew, has been appointed a director of the firm. He is a director of the Midland Bank, Ltd., the Clydesdale Bank, Ltd., the Burmah Oil Co., Ltd., and other undertakings.

MR. ARTHUR MANNING STURGES, who was for twenty-five years an analytical chemist with Imperial Chemical Industries, Ltd., at Northwich, has died at East Dean, near Eastbourne. After he resigned this appointment he established a bee farm in Sussex, which was visited by apiarists from all parts of the kingdom.

AN EXTRAORDINARY MEETING of Fison, Packard and Prentice, Ltd., is to be held on January 15 to consider a resolution authorising the increase of the capital to £700,000 by the creation of 48,000 new ordinary £1 shares, such increase being required for the purpose of acquiring the issued share capital of another company and for other purposes.

NO DEFINITE SCHEME for the reorganisation of the steel industry or the setting up of a national authority for the control of output and prices has yet matured, said Sir William Larke, director of the National Federation of Iron and Steel Manufacturers, on January 9. He added that reports now circulated purporting to give an outline of a scheme seem to be largely based on a White Paper issued last April.

AN ORDER of the Chancery Division, dated December 22, 1933, confirming the reduction of the capital of Southall Bros. and Barclay, Ltd., from £286,000 to £156,000, and the minute approved by the court, showing with respect to the capital of the company, as altered, the several particulars required by the statute, were registered by the Registrar of Joint Stock Companies on January 1.

APPLICATIONS FOR LICENCES under the Dyestuffs (Import Regulation) Act, 1920, during December totalled 679, of which 613 were from merchants or importers. To these should be added one case outstanding on November 30, making a total of 680. The Dyestuffs Advisory Licensing Committee granted 659 licences and referred 18 applications to British makers of similar products, leaving three cases outstanding on December 30.

THE CHILEAN CONGRESS has passd the Nitrate Bill creating a sales corporation for nitrate and iodine. Under the terms of this measure Cosach, the £75,000,000 nitrate combine, becomes inoperative. The Compania de Salitre de Chile (Cosach) was constituted in 1931 to combine all the interests in the natural nitrate of soda industry. American, British, German, Chilean, French and Spanish interests were represented. British interests ranked third.

THE NEW CHEMISTRY BUILDING of the University of Leeds, which forms the latest addition to the general extension scheme, was opened by Sir Frederick Gowland Hopkins, President of the Royal Society on January 12. To-day Professor R. W. Whytlaw Gray, F.R.S., head of the Chemistry Department, and the other professors of the department, will give a reception at which the library presented to the department by Mrs. Chaston Chapman will be opened. This library has been given by Mrs. Chapman in memory of her husband, Dr. Chaston Chapman, F.R.S., who was educated at Leeds Grammar School, and it contains his valuable collection of chemical journals and treatises. For some time the Department of Chemistry has been working under very cramped conditions, and when the Chairs of Organic and Physical Chemistry were instituted, largely through the efforts of Professor Smithells when he was professor of chemistry at the University, they had to be housed in temporary and scattered buildings. Now all the various sactions of pure chemistry have been gathered under one roof in a building admirably suited both to the teaching and research needs of the department.

THE EWALD COAL MINE, of Essen (Germany), has denounced its membership in the German Nitrate Syndicate from June 30, 1935, the next date possible. Although Ewald's quota in the syndicate only totals 2.5 per cent. or 22,500 metric tons of nitrate annually, this step may result in the breaking up of the syndicate on that date, unless negotiations prove successful.

A DISTILLERY FOR WOOD-SPIRIT is being built in connection with the Haarla pulp mill, Finland, utilising the sulphite waste. The output is estimated at between 800,000 and 1,000,000 litres per annum. Building operations have already commenced and it is expected that production will start in May. The greater part of the machinery is being constructed in Finland.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Egypt.—The Commercial Secretary to the Residency, Egypt, reports that the Survey of Egypt is inviting tenders for the supply of (a) 2,800 tins of photographic developing powder, each tin to make 10 American or 8 British imperial pints of developer; (b) 3,600 tins of acid fixing powder, each tin to make 6 American or 5 British imperial pints of fixer. (Ref. B.Y. 7734.)

Books Received

Science Progress, No. 111. January, 1934. London: Edward Arnold and Co. 226 pp. 7s. 6d.

Veroffentlichungen Des Wissenschaftlichen Zentral-Laboratoriums der Photographischen Abteilung Agfa. I. G. Farbenindustrie Aktiengesellschaft. Leipzig: S. Hirzel. Pp. 313. RM. 15.

Official Publications

The Action of Solvents on Coal. Fuel Research Technical Paper No. 37. Department of Scientific and Industrial Research. Pp. 216. 4s. 6d.

The Chemistry of Flesh Foods and their Losses on Cooking. By R. A. McCance and H. L. Shipp. Privy Council Medical Research Council. London: H.M. Stationery Office. Pp. 146. 2s. 6d.

Bulletin of the Imperial Institute. Vol. XXXI. No. 3. 1933. London: John Murray. Pp. 141. 3s. 6d.

Report of the Fuel Research Board for the Year ended March 31, 1933. Department of Scientific and Industrial Research. London: H.M. Stationery Office. Pp. 140. 2s. 6d.

Economic Conditions in Egypt, July, 1933. By G. H. Selous and L. B. S. Larkins. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 138. 4s.

Trade and Economic Conditions in China 1931-33. By Louis Beale and G. Clinton Pelham. Department of Overseas Trade. London: H.M. Stationery Office. Pp. 176. 4s. 9d.

The Yorkshire, Nottinghamshire and Derbyshire Coalfield. Nottinghamshire and Derbyshire Area—The Deep Hard Seam. Fuel Research—Physical and Chemical Survey of the National Coal Resources, No. 30. Department of Scientific and Industrial Research. 84 pp. 2s. 6d.

Forthcoming Events

Jan. 15.—Institute of Metals (Scottish Section). "Factors in the Solidification of Molten Metals." Sydney W. Smith. 7.30 p.m. 39 Elmbank Crescent, Glasgow.

Jan. 15.—Institute of Chemistry and Society of Chemical Industry (Glasgow Sections). Joint meeting. "Infra-Red Photography." H. H. Flower. 7.30 p.m. Royal Technical College, Glasgow.

Jan. 15.—The Chemical Club. "Recent Advances in Chemistry as Applied to Criminology." Dr. Ainsworth Mitchell. 8 p.m. 2 Whitehall Court, S.W.1.

Jan. 16.—Institution of the Rubber Industry (Manchester Section). "Tubing Machines and Extrusion Problems." H. Willshaw. Victoria and Station Hotel, Preston.

Jan. 16.—Midland Metallurgical Societies. "Electric Welding." C. A. Hadley. 7 p.m. James Watt Memorial Institute, Birmingham.

Jan. 16.—Institute of the Plastics Industry (London Section). "Continental Moulding Practice and Plant." J. Clubley Armstrong. Windsor Castle Hotel, Victoria, London.

Jan. 17.—Manchester Metallurgical Society. "Bearing Metals." A. J. Murphy. 7 p.m. Engineers' Club, Albert Square, Manchester.

Jan. 17.—Society of Glass Technology. Leeds.

Jan. 18.—Society of Chemical Industry (South Wales Section). "Hydrogenation of Coal." Dr. W. Idris Jones. 7 p.m. Technical College, Cardiff.

Jan. 18.—Society of Dyers and Colourists (West Riding Section). "Recent Investigations on the Textile Fibres." R. Owen Jones.

Jan. 18.—Society of Chemical Industry (Nottingham Section). "Some Observations Regarding Unshrinkable Finish." Professor A. T. King. 7.30 p.m. University College, Nottingham.

Jan. 18.—The Chemical Society. Ordinary Scientific Meeting. 8 p.m. Burlington House, Piccadilly, London.

Jan. 19.—Society of Chemical Industry (Manchester Section). "Manchester and the Fuel Industries." Dr. F. S. Sinnatt. 7 p.m. 17 Albert Square, Manchester.

Jan. 19.—Society of Dyers and Colourists (Manchester Section). "The Printing of Celanese." G. Holland Ellis. 7 p.m. 36 George Street, Manchester.

Jan. 19.—Society of Chemical Industry (South Wales Section). Joint meeting with the Institution of Petroleum Technologists. Paper by Dr. A. E. Dunstan. 7 p.m. Thomas' Café, High Street, Swansea.

Jan. 19.—West Cumberland Society of Chemists and Engineers. "Roads and Road Construction." J. Penman. 7 p.m. Workington.

Company News

Horace Cory.—The directors announce that consideration of payment of preference dividend for year must be deferred until accounts are available. (Dividend paid to December, 1932.)

International Carbonizing.—The accounts of the company (which owns shares in Peco) show a debit of £284 to June 30. With £18,465 brought in, forward debit is £18,749.

Sangers, Ltd.—An interim dividend of 8¼ per cent. on the old ordinary shares is announced, as compared with 7½ per cent. last year, when there was a final of 10 per cent.

British Tin Investment Corporation.—A dividend of 4 per cent., less tax, is announced for 1933. The report will be posted on January 15, and the annual meeting will be held on January 23.

Mutamba Sugar Factory.—Controlled by trustees for debenture-holders. The net loss to September 30 was £2,544, against £2,774. Adding debit of £41,404 brought in, the deficiency carried forward is £43,949.

Bradford Dyers' Association.—Interest on 4 per cent. debenture stock has been paid this week; decision as to payment of preference dividend stock for current year will be made when accounts become available in February.

Associated Paper Mills.—The report for the year to September 30, 1933, states that, subject to depreciation, the net profit, after meeting directors' fees, interest on loans and debenture stocks, etc., amounts to £35,734. Last year the net profit, before depreciation, etc., amounted to £44,522. Meeting, Winchester House, Old Broad Street, E.C.2, on January 18, at 12 noon.

New Chemical Trade Marks

Opposition to the registration of the following trade marks can be lodged up to January 20, 1934.

Astol. 543,662. Class 1. Chemical substances, not being dyestuffs, for the treatment of textile materials, but not for colouring or varnishing treatments. British Dyestuffs Corporation, Ltd., Imperial Chemical House, Millbank, London, S.W.1. August 9, 1933.

Opposition to the registration of the following trade marks can be lodged up to February 3, 1934.

Rex High Test Lye. 545,103. Class 1. A caustic soda lye for use in manufacture. The Cudahy Packing Co., 221 North La Salle Street, Chicago, Illinois, United States of America; 33rd and Q Streets, South Omaha, Nebraska, United States of America. October 6, 1933. (By consent). Registration of this trade mark shall give no right to the exclusive use of the words "High Test."

Glaztex. 546,325. Class 1. Varnish having a synthetic resin base. Spray-Textures, Ltd., 34-35 Norfolk Street, Strand, London, W.C.2. November 20, 1933.

Rådrosal. 546,609. Class 1. Sodium chloride for use as a regenerating agent in water softening apparatus. Press Caps, Ltd., 21 Gorst Road, Chase Estate, Park Royal, Willesden, London, N.W.10. November 29, 1933.

ADVERTISERS please note that the latest hour at which we can accept advertisements for insertion in these columns each week is 10 o'clock on Thursday morning.

APPOINTMENTS WANTED

(Prepaid—Twenty-seven words 1s. 6d.; every additional nine words 6d.) Replies can be received "Box , Office of this Journal," in which case our address is included in cost of advertisement, and charged as nine words.

METALLURGICAL Chemist desires Position; 10 years' experience treatment of gold ores, platinum refining, assaying and research work; excellent testimonials. Box 1544, THE CHEMICAL AGE, 154 Fleet Street, London, E.C.4.

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SPLENDID Opportunity for Chemist at Orpington Garden Estate. Modern Shop; write or call. Shops also available on Godstone Road, Whyteleaf, Surrey; particulars on request. E. O'SULLIVAN (KENLEY), LTD., Arterial Road, St. Mary Cray, Kent.

FOR SALE

(1s. per line; minimum charge 3s. Sixpence extra is charged when replies are addressed to Box Numbers.)

BROUGH'S Patent Indestructible Drums and Kegs, also Plain Welded, Double-seamed or Corrugated Drums and Kegs, of every description, from 1 to 80 gallon.—4 Upper Parliament Street, Liverpool. Telephone: Royal 2685. Telegrams: Superdrum, Liverpool.

CHARCOAL, ANIMAL and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill Jones Pop., London." Telephone: 3633 East.

CROSSLEY-PREMIX Gas Plant in perfect condition, size "H," capable of producing 24,000 cu. ft. gas per hour. Giving perfect satisfaction; only reason for disposal is that the price of London Gas to manufacturers has been reduced. Any reasonable offer will be considered. Apply Box 1542, THE CHEMICAL AGE, 154 Fleet Street, London.

HYDRAULIC PRESSES AND PUMPS. Large stock in London. Price quoted for adapting and erecting.—THOMPSON AND SON, Maria Street, Millwall.

MIXERS by Werner and other makers, jacketed pans, disintegrators, grinders, good stock.—C. F. DAVIS, LTD., Hatcham Road, Old Kent Road, London, S.E.15.